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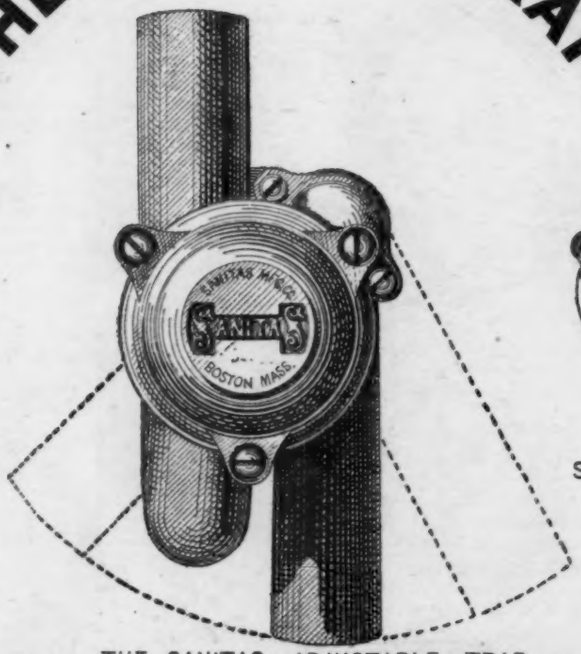

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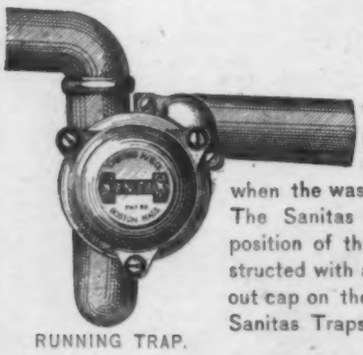

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THE Western State associations of architects show generally a very gratifying degree of activity, and there are indications that many of the reforms and advances which we look for in professional life in this country are likely in future to be originally proposed and discussed in the local organizations, and perhaps tried by them in practice, before they are finally adopted by the great representative bodies of the profession. The meetings of these societies are not too frequent, and are made as attractive as possible, so as to call out a large attendance, and as the members soon form a somewhat intimate acquaintance with each other, any new scheme is considered, first privately, and then officially, with a freedom and thoroughness which is not possible at conventions of the great associations. The Illinois State Association has just taken up with vigor the important question of protective organization, and we hope will be able to accomplish something before the meeting of the two conventions in October and November next, which those conventions may find of great use. We are inclined to think that for the purpose of professional protection although the meeting of the State Societies are the best places to discuss the matter in, an organization embracing the whole country would be more useful than a number of local ones. The prosecution of such duties would soon bring in a mass of precedents, legal suggestions, and experience, which would be far more valuable in the hands of a single body than if scattered among the records of the Executive Committees of twenty State Associations, with, probably, an amount of repetition, and a diversity of arrangement, which would make it impossible ever to collect and digest the material for the common benefit. Moreover, while the amount of business to be transacted by a State Protective Association would probably only be enough to require a quarterly or semi-annual meeting of its officers, and the dues collected, unless made oppressively high, would hardly furnish fees which would induce the ablest lawyers to undertake the trouble of studying thoroughly questions so technical and so strange to them as those involved in architects' cases, a national organization, judging by the experience of that existing in France, would have enough business to keep one or two first-rate lawyers interested in its work, and as it would have sufficient income to pay them suitable fees, they would be glad to acquire the special knowledge which would render them most useful to their clients. How valuable this knowledge would be in shortening the duration of trials, in selecting witnesses, citing cases, and making explanations to judge and jury, those architects who have had suits of their own, or have testified as experts in those of others, will readily understand, and, besides its superior facilities for commanding the services of counsel thoroughly versed in building matters and architectural practice, a national association, by its higher prestige, and its more impersonal quality, would, we think, gain more respectful attention to its representations than would be accorded by most oppressors of architects to a body composed of their own fellow-citizens.

A CHURCH tower fell in Washington lately, under circumstances which will make the investigation of the causes of the accident very interesting. The church was a new one built of stone, and furnished with a square tower, one hundred and fifty-eight feet high. At the ground-level the tower was pierced with openings on three sides. The main part of the building was almost entirely completed, and the tower was ready for the roof, when cracks appeared in the cut-stone water-table of the tower, and in the main wall of the church near the tower. The architects were notified, and on examination, concluded that the cracks in the water-table were due to the settlement of the backing, which showed signs of having forced out the water-table in front. To remedy this, the joints above and below the water-table were sawed out, to allow a slight settlement of the facing, and no further movement showed itself until a few day's ago, when the workmen on the building noticed fresh cracks. The only person to whom these indications seemed important was the watchman, who made up his mind that the tower was about to fall, and stationed himself on the opposite corner of the street to see the catastrophe. After waiting nearly all night, the tower actually fell, fortunately for him, instead of bending outward, it collapsed vertically, the stones not falling beyond the sidewalk line. A portion of the adjoining wall of the church, and of the roof, was demolished, but the damage was comparatively slight. The cause of the accident seems quite uncertain. Although the piercing of the lower walls of a tower in careless or ignorant hands is often dangerous, the strength of the piers remaining had in this case been calculated accurately, and a large surplus of strength allowed, and if, as the Washington *Star* reports, the lower part of the tower still remains intact, there can be no question as to the sufficiency of its supports. In this case it seems probable that the accident should be laid to that fertile source of mishaps with stonework, the unequal settlement of the face and backing of the walls in the middle portion of the tower, but, until the ruins are cleared away, no definite explanation can be offered.

THE New Orleans *Picayune* has a new theory about building laws. After quoting at some length the provisions of the building regulations of Berlin, apparently without the slightest suspicion that nearly all the large cities in the Northern and Middle States have similar ones, it proceeds, with the lofty scorn which used to animate our politicians of forty years ago, to say that "Monarchical and despotic governments appear to concern themselves a good deal with the private affairs of their subjects. Republican governments properly concern themselves chiefly with levying taxes and enforcing their collection. In matters of personal protection the people must take care of themselves." According to this doctrine, if a man wishes to build houses in such a way that they fall down on the heads of the passers-by, or to arrange his drain-pipes so that they poison his neighbors, or to plan factories and school-houses with a view to having the persons in them compelled to jump out of the upper windows, in case fire breaks out in the basement, he must not be interfered with, as these are private affairs, with which only monarchical and despotic governments meddle. "In matters of personal protection," in the land of the free and home of the brave, "the people," we are told, must take care of themselves, by wearing iron helmets, and germicide respirators, and asbestos garments, we suppose, and the government should content itself with applying the screws to the tax-payers, to raise funds for buying votes and enriching the members of the ring. We do not know how it may be in Louisiana, but in this part of the country the republican government have brought the art of "levying taxes and enforcing their collection" to a point which would provoke a revolution within a year in most "monarchical and despotic" countries, and, at the risk of seeming to the *Picayune* "un-American," if not, indeed, suborned by monarchical and despotic gold, we cannot help thinking that the practice of utilizing some of the surplus energy left after collecting the taxes in looking out that the people who pay them are not slaughtered with impunity by greedy builders in theatres, tenement-houses, hotels, factories and school-houses is one quite worthy of the government of a free community.

WHAT interesting publication, the form of contract "adopted by the Joint Committee of the American Institute of Architects, the Western Association of Architects, and the National Association of Builders," has just been issued, and is probably by this time in the hands of most of our readers. The specimen copies sent to architects are accompanied by a circular, which requests the adoption of the form in the practice of the recipient; and an arrangement has been made with the Inland Publishing Company, of Chicago, for furnishing the blanks, with or without the insertion of the name of the architect ordering them, at a very moderate price, copies without inserted names being sent, free by mail or express, for eight dollars per thousand, well printed on good paper. In general, the work of the Joint Committee deserves the highest praise. We must confess to having had some misgivings, after reading the circular of a year ago or more, in which the Master-Builders' Association described its views on the subject of contracts, lest the form adopted should introduce novelties of a kind very inconvenient to the architect, and unpalatable to the owner; but the architects on the Joint Committee have taken good care, not only of professional interests, but, as it appears of those of owners; and although, if the owners had been represented on the Committee, we imagine that they would have claimed some of the authority given by the form to the architect, their rights have been so carefully defined and guarded that they may well believe that their exclusion, for instance, from the privilege of ordering extras, is intended, not, as Lord Grimthorpe thinks, to enable the architect to run riot at his employer's expense, but to enable the former as the medium through which orders for extras must come, to keep them properly recorded, and to estimate the value of them intelligently, without the confusion, and, in many cases, the serious losses to the owner, which follow from conflicting directions given, or pretended to have been given, by architect and owner independently to a crafty contractor.

IN one or two respects we think the form might be improved, or, we should more modestly say, we do not see the advantage of the variation which it presents from the ordinary model. In its first clause, the agreement provides that the contractor shall "well and sufficiently perform and finish" the work required, "under the direction and to the satisfaction of the Architect, *acting as agent of said Owner.*" We suppose that the Joint Committee must have had good reasons for inserting the words which we italicize, but it seems to us that very good ones ought to be necessary for incorporating in a building contract an admission that the architect is the agent of the owner, as against the contractor, instead of being, what the law presumes him to be, a learned and impartial judge between them. The courts are frequently called upon to consider arguments offered by counsel for contractors who wish to get paid for work which the architect refuses to accept, to the effect that the architect is the agent of the owner, that the law forbids any man to be judge in his own case, and that as, on this principle, an owner cannot avoid paying for work done for him on the ground that it is unsatisfactory to him, the certificate of his agent, being his own certificate, is not conclusive as to payments to be made by him. To this the usual answer of the judges is that the architect is not the agent of the owner in this matter, but an independent expert, who is presumed to decide fairly between the parties, and whose award cannot be regarded as the act of the party who wishes to avoid payment; and on this ground the certificate has almost invariably been sustained. If, now, the accepted form of contract expressly declares that the certificate of the architect is given, not as the opinion of an impartial man of science, but as the device of the agent of a person who presumably wishes to escape from paying his debt, although the clause can be enforced just as one might be enforced which demanded the certificate of the owner himself as a condition precedent to payment, it seems to us likely to be regarded as violating the spirit of the law, and to be set aside on the smallest pretext, greatly to the detriment of the dignity and authority of our profession.

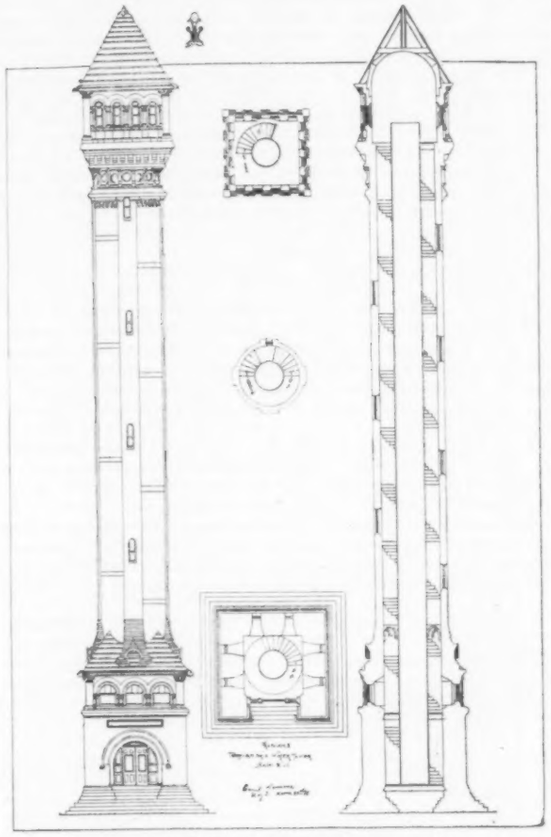
THE last Bulletin of the French Architects' Protective Society shows that its work is increasing, and its influence rapidly extending. It has now more than two hundred members, including the most distinguished men in the profession; it defended the interest of its members last year in four suits, two of which were carried through successfully, while the other two are still in court; and its aid has been invoked in six new ones, which have not yet reached the stage where their circumstances can be made public, but which, we are told, involve two or three questions of great professional importance. One other case, involving the ownership of drawings, which has been long in litigation is now decided, and the architectural community will hear the result of the trial with much interest. It seems to be considered hopeless in France, as in England, to try to open the eyes of courts to the fact that clients do not pay for drawings, but for professional services in which drawings are instruments; but this was a peculiar case, in which the Society saw an opportunity to gain a point in the struggle for architects' rights in the matter, and took up the contest with a zeal which deserved success. It seems that an architect was invited to take part in a limited competition for a group of schoolhouses, the cost of which was restricted to eighty thousand dollars, while the execution of the work was promised, at the usual compensation, to the successful competitor. The applicant for the Society's aid was placed second by the professional judges, but it was proved that his design was the only one which could be carried out within the limit of cost. Before anything was done toward executing the design, the town elected new officials, and the whole project was forgotten by every one except the architect. After waiting awhile, he sent in his bill for services, and was refused payment. He brought suit, and recovered twelve hundred dollars, being one and one-half per cent on the proposed cost of the work. His drawings had been returned to him, and before the town officers would pay him what the court had awarded him, they demanded that the drawings should be given up. The architect declined to part with them, and the town then applied to the court to know whether the award of damages did not imply the surrender of the plans. The lower court held that it did, and an appeal was taken to the Council of State, which decided last month that "As the damages awarded represented the architect's remuneration for his work, by paying them the town became proprietor of his drawings," and decreed that they should be given up.

MR. E. R. ROBSON, the distinguished author of the best work on School Architecture ever published, and until recently architect to the London School Board, has been drawn into a controversy with the Board which is of great importance to the profession. Some time ago, under Mr. Robson's direction, an important group of school buildings was erected on Broad Street in London. Lately, cracks appeared in the walls, and on investigation it appeared that the concrete footings were of bad quality, and that much less concrete had been put in than the specifications called for. Thereupon, after the usual fashion of boards and committees, instead of applying for redress to the constructor who agreed to put in the foundation according to the specification, and got paid for doing so, the Board left him to enjoy his ill-gotten gains in peace, and made a formal demand on Mr. Robson to take the amount out of his own pocket, and hand it over to them, on the ground that, having certified that in his opinion the contractor had completed his agreement, it was for him, in case his opinion was a mistaken one, to make good the contractor's fault at his own expense, while the contractor might keep the money which he had not earned, without being even asked to return it. In Mr. Robson's case, the hardship, or rather, the insolent brutality of the demand was enhanced by the fact that in the discharge of his duties as architect to the Board he was called upon to carry out so many buildings that it was utterly impossible for him to give personal inspection to all of them. This was perfectly well understood by the Board, which appointed a clerk-of-works for the express purpose of seeing that the specifications was carried out, and in addition to this officer, an Inspector of Works, which appointment was made on the distinct ground that Mr. Robson's time was so valuable to the Board for other purposes that he ought to be relieved of the bulk of the work of inspecting buildings in progress. The School Board does not deny this, but claims that by signing a certificate for payment, relying on information brought him by the agents appointed by the Board for the purpose of furnishing him with such information, he rendered himself personally liable to make good all faults which the Board's agents should fail to discover in the work of the Board's contractors. The *Builder* pronounces this claim "morally absurb," and believes that it will be found "legally untenable" and we trust that the event will prove it so.

ARCHITECTUAL EDUCATION IN THE UNITED STATES.[1]

II.

THE UNIVERSITY OF ILLINOIS.



Water-tower designed by a Student at the University of Illinois.

THE University of Illinois is an institution which was organized under the same conditions as Cornell and the Institute of Technology, although it differs from both of them in being practically a free school. It is located at Urbana, Ill., about one hundred and twenty-five miles south of Chicago, lying near the boundary lines between the cities of Champaign and Urbana, which together have a population of some eight thousand. The University was opened in 1868, and at that time had a nominal department of architecture, which, in the fall of 1869, was placed under the direction of Mr. James Bellangee, a graduate of the Science-Department of Ann Arbor University. Mr. Bellangee had worked for some time in an architect's office in Chicago, but, we believe, had had no special technical training. The special instruction afforded by the course was limited to architectural drawing, descriptive geometry and projection drawing. In 1871 Mr. Harald M. Hausen took charge of the department. He was a graduate of the School of Architecture in Christiana, Sweden, and had studied two years at the Bau Academie in Berlin. He remained at the University for only a year, and did little to establish the department. Mr. N. Clifford Ricker, the present incumbent of the chair of architecture, was at that time a student in the so-called architectural course under Mr. Hausen, a course including a few engineering branches and a very slight smattering of drawing and design, excellent of its kind, but very limited in extent. During 1872 Professor Ricker studied in the office of J. W. Roberts, architect, in Chicago, a pupil of Mr. Richard Upjohn, and in the fall of the same year assumed charge of the Architectural Department at the University. The next summer Professor Ricker went to Berlin where he entered the Bau Academie as a special student, and afterwards travelled in Europe. The department of architecture has since that time been developed entirely by his individual exertions, and he has been almost alone in the work, the funds of the University not allowing him a very generous amount for equipment, photographs, etc., especially as the attendance has always been rather small.

It would hardly be worth while to consider in detail the growth of the system of instruction from the condition under which Mr. Hausen left it to its present state, and for the purpose of comparison with the other colleges it will be sufficient to consider the course of studies as it now exists. According to the by-laws of the University, the studies are elective in the sense that a student may pursue a selected course and graduate from the University, becoming an alumnus; but a prescribed course is rigidly required for a degree. The course in architecture, as at present laid down, extends through four years; but this requires so much time, and so many draughtsmen and young architects are unwilling to spend four years in this kind of preparation, that the trustees of the University decided to establish a special course for those who do not desire to take up all the technical studies. This is known as the Builders' Course. Candidates must pass examinations in the common branches, but not in the studies of the preliminary year, unless they desire to pursue other studies later on. The Builders' Course is as follows, occupying a single year of three terms:

1. Wood Construction.
   Projection Drawing.
   Shop-Practice (Carpentry and Joinery).
2. Stone, Brick and Metal Construction.
   Architectural Drawing.
   Shop-Practice (Stair-Building).
3. Graphical Statics.
   Architectural Designing.
   Shop-Practice (Cabinet-making).

This course is evidently quite superficial in its nature. Unfortunately, it finds many followers, though the number is, we believe, decreasing from year to year.[2]

The regular course of studies is as follows:

FIRST YEAR.

1. Trigonometry.
   Projection Drawing.
   Shop-Practice.
   French or German.
2. Analytical Geometry.
   Descriptive Geometry and Lettering.
   Shop-Practice.
   French or German.
3. Advanced Algebra.
   Graphical Statics.
   Shop-Practice.
   French or German.

SECOND YEAR.

1. Elements of Wood Construction.
   Calculus.
   Free-Hand Drawing and Modelling.
2. Elements of Stone, Brick and Metal Construction.
   Advanced Analytical Geometry.
   Architectural Drawing and Designing.
3. Elements of Sanitary Construction.
   Advanced Calculus.
   Water-color Sketching.

THIRD YEAR.

1. Architectural Drawing.
   Analytical Mechanics.
   Chemistry.
2. History of Architecture.
   Resistance of Materials.
   Physics.
3. History of Architecture.
   Advanced Descriptive Geometry.
   Physics.

FOURTH YEAR.

1. Esthetics of Architecture.
   Architectural Perspective.
   History of Civilization.
2. Architectural Designing.
   Heating and Ventilation.
   Constitutional History.
3. Architectural Designing.
   Estimates, Agreements and Specifications.
   Political Economy.

In order to more clearly appreciate the relative importance given to the various branches, a summary may be of interest, as follows:

Under the head of pure mathematics we find that trigonometry, geometry, algebra and calculus together occupy 360 hours. Applied mathematics, such as descriptive geometry, graphical statics and resistance of materials occupy 480 hours; theoretical study of construction occupies 336 hours; languages, limited to either French or German, have 180 hours; the theory of architecture, including history, esthetics, and lectures on color and the like, has 360 hours; drawing occupies 960 hours; shop-practice 360; and a few side branches, such as chemistry, physics, political economy, etc., together take up 384 hours; making the total number of hours for the whole course 3420. It will be seen by this summary that 28 per cent of the time is given to drawing, and 31 per cent to studies which are purely architectural in their nature, including the shop-practice, so that altogether 59 per cent of the students' time is occupied entirely with architecture, while 41 per cent of the entire course is given to studies which do not bear directly upon the profession in one way or another.

Let us now consider the method in which the instruction is communicated to the pupil. The first purely technical exercise of the student is shop-practice, which comes into the first year of the course. Shop-work was introduced into the University by Professor Ricker, in 1873, after having made some investigation of the Russian system as illustrated at the Vienna Exhibition. This was the first

[1] Continued from page 49, No. 658.

[2] Prof. Ricker writes us as follows: — "The Builders' Course is primarily intended for the benefit of mechanics, who have long left school, cannot spare the time for preparing for the required entrance-examinations to the University, or for young men with imperfect preparation, who wish to learn a trade afterwards, and the students in this course have been almost wholly drawn from these two classes. The number taking the Builders' Course rarely is one-fourth that of students in the Architects' Course, though now twice that in any previous year. To guard against abuse of this course and prevent it from becoming a kind of bye-pass around the entrance examinations, three restrictions are provided:

1. A tuition fee of $5 per term is required,
2. Members of the class rank as preparatory students.
3. Attendance is strictly limited to a single year and to the studies of the prescribed course only; should a student wish to take other studies or remain longer, he must pass the full examinations and matriculate.

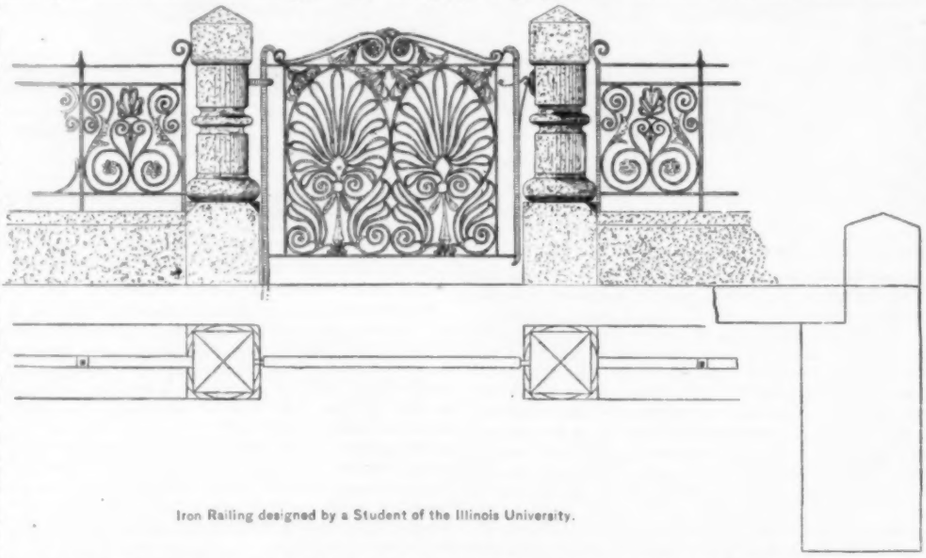
I think the effect of the course has been good.

1. Most of these students are skilled mechanics, who wish instruction in the most essential branches, and it should be provided for them in this State University.

2. Most become foremen or builders, very few draughtsmen or architects. So I think that we avoid most of the evils of the two years' or special courses as pursued in other colleges."

use of the system in a school in this country. The practice at the shop during the first term includes all of the ordinary roof-carpentry and joining work, such as trussing, planing, splicing, joining, dovetailing, etc., the work being done on pieces about one foot long and two inches square. In the second term attention is given to cabinet-making, with glued joints, bead-work, chamfers, inlaid-work and turning. In the third term the student is employed in the construction of models of roofs, towers, window, door-frames, etc., to scale and from drawings, to give him some knowledge of general construction. During the last of the term some attention is given to stone-cutting by the help of plaster-blocks, three or four pieces being worked up in the ordinary methods of dressing stone. Professor Ricker says he does not feel entirely satisfied with the way in which this work is handled in the shop, and hopes, eventually, to have real stone and stone-tools to work with. This shop-practice is practically several degrees better than what one would get by apprenticing himself to a regular builder, at least so far as concerns mere handicraft, although, of course, students in the shop can get no idea of the mechanical construction of a large building.

As a necessary and natural sequence of shop-work comes the study of theoretical construction occupying the greater part of the second year. This is illustrated with models, photographs, etc., the lectures being type-written by the department on prepared tracing-paper and blue-printed, so that each student can have copies of the lectures by paying for the cost of the blue-printing, which the University does at the rate of one and a quarter cents per page, making for the entire work a cost of about three dollars and sixty-five cents. A pupil often uses a copy and then sells it to a member of the next class. Each student in the class, however, is obliged to possess a copy. The lectures are not delivered orally, but specified portions of the topic are assigned for each day, and the students are required to post themselves and be ready for recitations. The study includes the consideration of materials, seasoning, shrinkage, dry-rot, various kinds of lumber, strength of materials, joints and fastenings used in carpentry, methods of construction of framings, walls, ceilings, trusses, groined-work, roofs, etc., in fact all that has to do with carpentry in construction. In the first term's work the student is required to make twenty plates in illustration of the topics, selecting from definite topics given out. In the second term's work some time is given to the study of stair-building in so far as relates to the general principles of planning, and students are admitted to a special course for working-out the constructive details of stair-building, though this is purely optional. In the latter part of the term's study, brick construction is taken up and discussed in its various details, also the subject of foundations, iron and steel as materials for building operations, stonework, tiles, terra-cotta, etc., and corrugated-iron. All the recitations, which are drawn directly from the professor's written notes, are supplemented by practical problems in which the student has to use his knowledge and show that he appreciates what he has been reciting.



Iron Railing designed by a Student of the Illinois University.

Closely involved with the theory of construction is that of sanitary engineering in the third term of the second year of the course. Paul Gerhard's "*Drainage and Sewerage of Buildings*," and Staley's "*Separate System of Sewerage*," are used as text-books, with lectures by Professor Talbot, the assistant in engineering. This study occupies only half of the term, the remainder being given to practice with civil-engineering and surveying instruments.

The instruction in drawing is naturally one which is bound to receive the most attention. A certain facility in drawing is presumed to be possessed by the pupil before entering the University, though practically it is found that the student knows little more than how to hold his tools. Architectural drawing, as such, does not enter into the course until the second term of the second year, though in the first term of the second year time is allowed for a certain amount of free-hand drawing. It should be said, by-the-way, that all of the free-hand drawing taught in the University, is under the direction of Professor Ross, a graduate of the Normal Art School of Boston, who has been doing some excellent work in Champaign, and has built up a very interesting department there.

In architectural drawing, as such, a start is made by using Tuthill's "*Architectural Drawing*" as a text-book, the student being required to work up one set of drawings each term. During the second year, in case the student has had previous experience, he is allowed to draw out some building in elevation from some published perspective, or if far enough advanced, is instructed in simple tinting and etching with a pen. Perspective is taught by the use of Professor Ware's text-book, practice being obtained by working out four or five examples which are given by the professor. Of course, it is very difficult to develop a great deal of architectural ability in a student in the course of two terms of architectural drawing. The University does not profess to make finished draughtsmen, but to show the way and lead the student to work on his own lines, the time being so short that is given to the study, as such, though in subsequent terms a great deal of architectural drawing will naturally work into the course, if the student is at all ambitious, and as a fact most of the students do a great deal more architectural work than is strictly required by the curriculum.

Following this, the student is given some practice in architectural designing, though this comes only in the last year of the course. During the second term of the fourth year six problems are given to each student beginning with a small detail of a building, and working up to a small problem of an entire structure. In the third term, the last of the course, a single large problem is given each student, and this is worked out fully, with all necessary drawings and an outline of specifications, just as if it were an actual problem in professional practice.

It generally happens that students, if they become interested in the course, will begin the designing earlier than the senior year, and so a great deal more work will be accomplished in this direction than would be inferred from the list of studies.

Lectures on the history of architecture are written out and blue-print copies are made the basis of the instruction, supplemented by reading of various standard authors and discussions of essential points. For purposes of illustration Professor Ricker uses a large collection of mounted engravings, photographs, etc., drawn from all possible sources, arranged in architectural sequence and brought in with such lecture as may be necessary. In order to fix in the students' minds the distinction in style, each one is obliged to make during a term five plates or tracings of architectural details. The students are at liberty to select what details they will trace, but the University retains the tracings and furnishes the pupils blue-prints of the same at a cent and a quarter per sheet, so that each student can have at a very slight outlay a very valuable assortment of tracings illustrating the lectures he has been studying. The lectures on the history of architecture are written out and blue-printed in the same manner as the lectures on construction, and each student is obliged to have an entire copy of the lectures for the year.

For the students of esthetics a translation has been made by Professor Ricker, of Redtenbacher's "*Die Architektonik der Modernen Baukunst*." The translation is blue-printed, and the students provided with the prints which serve as the basis of the recitations. In the same way a translation of Planat's "*Chauffage et Ventilation des lieux Habités*" is used for the study of heating and ventilation. Each of these topics is supplemented by practical problems, worked out by the students.

Six weeks are given to a consideration of estimates, based upon Vogdes's "*Pocket-Book*," and supplemented by blue-printed lectures, some thirty problems being worked out by the pupil. Two weeks more is given to agreements and specifications, the student being required to fill out blank specifications, etc., for various special cases. A portion of the term is also devoted to the study of Professor Clark's "*Building Superintendence*."

The students are not advised to do outside office-work until their junior vacations. It has been found that the students have to be handled very tenderly, as they are so apt to become discouraged with the study of purely technical branches, and it is hard to make them appreciate the necessity of schooling in architecture. At present

there are no requirements made of students in the way of vacation work.

In regard to the equipments of the school, there is still a great deal to be desired. Professor's Ricker's department is known as the School of Architecture of the College of Engineering, and it forms but a small branch of the University proper, so that it has been very difficult to make the trustees appreciate the necessity of providing proper endowments and equipments for the architectural department of a University, which in the beginning was intended to be chiefly an agricultural college. Professor Ricker has, however, fought nobly and evolved a great deal out of a very little. The Architectural Department has a number of rooms in the upper story of the main University building, and for shop-work occupies the greater portion of what is known as the Mechanical Building, a structure devoted on the ground-floor entirely to shop-work, the upper story being one large room used as a drill-hall. The University library is fairly well equipped with architectural books. All of the leading publications are represented, and many of the less noted ones. For periodicals the department receive Daly's *Revue Générale*, the *Builder*, the *Engineering and Building Record*, the *American Architect*, the *Decorator and Furniture*, the *Art Amateur* and the *Portfolio*, London. Besides these, there is quite an extensive collection of photographs, which are kept in the lecture-rooms, where they are readily accessible for lectures. The department is benefited by its proximity to a very fair collection of casts, presented to the University by citizens of the adjoining towns, comprising specimens of the best sculpture from all the European galleries. Professor Ricker has also at his disposal a collection of casts presented by the Spanish Government, and another of casts of various architectural details from Lehr, of Berlin, together with models of ceilings, roofs, trusses, etc.

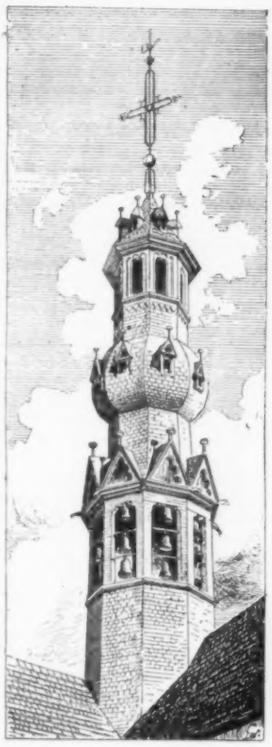
Applicants for admission to the School of Architecture are required to be over fifteen years of age, and to pass examinations in grammar, arithmetic, geography and history, as well as algebra, geometry, physiology, botany, natural philosophy and rhetoric. There does not appear to be any other limitation of age for attendance at the University, although we believe the average age of the graduates is about twenty-one. The number of pupils in the Department of Architecture is at present forty-four, including those who are following special courses. Of the graduates about half have remained directly or indirectly connected with architecture; one-quarter have gone into building operations as contractors, and the rest have abandoned the profession entirely. There have been twenty-four graduates in all, thus far, without counting some thirty special students who have gone out and since followed definite lines of architecture, and about fifteen or twenty who have gone into building, making in all nearly seventy-five graduates or ex-pupils of the department. This does not include students in the Builders' Course. The students come almost entirely from the West, and very few of them ever leave that section of the country.

The degree of Bachelor of Science is given to those who complete either of the courses of study in the College of Engineering, and a post-graduate degree of Master of Architecture is given on the recommendation of the Professor and preparation of a thesis.

In regard to the expense of attending the University, the tuition is free. Upon entering the University, however, the student is obliged to deposit a matriculation fee of ten dollars, and beyond this there is a fee for incidental expenses of seven dollars and a half per term. In the Builders' Course the tuition is five dollars a term in addition to the incidental fee. For the shop-work there is no charge whatever, not even for the material which is used. According to the estimates made by the University authorities, the maximum annual expense, exclusive of books, of a residence of thirty-six weeks at the University is somewhat less than two hundred and fifty dollars. In practice very few students go through on so little as this, and we believe the average is considerably higher, though there is no necessity for a student's expending more than three hundred or three hundred and fifty dollars per year. Twelve hundred dollars ought to carry a student easily through the entire course.

FIGURES OF THE TOWER BRIDGE. — The following technical description of the new bridge, which is rising east of the city under the direction of the corporation, and comparison with London Bridge, will interest, we believe, a considerable portion of our readers: Total length of bridge, 940 feet; total length of bridge and approaches, 2,640 feet; opening span width, 200 feet; opening span headway, when opened, 135 feet; opening span, headway, when shut, 29 feet 6 inches; side spans, width, 270 feet; side spans, headway, from 20 feet to 27 feet; width between parapets, opening span, 50 feet; width between parapets, side spans and approaches, 60 feet; steepest gradient of approaches, 1 in 40, (steepest gradient of approaches of London Bridge, 1 in 7;) depth of foundations, 60 feet below Trinity high water mark, 27 feet below bed of river; sectional area of waterway, 20,040 square feet, (London bridge, 19,300 square feet;) depth of water in opening span at high water, 33 feet 6 inches; depth of water in opening span at low water, 13 feet 6 inches. Estimated quantities of materials in the bridge and approaches — Bricks, 31,000,000; concrete, 70,500 cubic yards; cement, 19,500 tons; granite and other stone, 235,000 cubic feet; iron and steel, 10,500 tons. Machinery, etc. — Two steam pumping engines for hydraulic machinery, each 360 horse power, eight large hydraulic engines and six accumulators, four hydraulic lifts in towers for passengers; size of each leaf of opening span, 50 feet wide by one 100 feet long; weight of each leaf of opening span, including roadway and counterbalance weights, 700 tons; estimated cost, £750,000. — *The London City Press.*

A SUGGESTION FOR RELIEVING OUR CROWDED STREETS.



MANY important streets in our older cities have become not only too crowded for comfort, but so much so as to seriously interfere with their usefulness by limiting the amount of business that can be done upon them. The traffic upon a street may be considered under three heads — the street-railway, the wagons and the pedestrians.

In Boston so much has been written upon the question of the crowding by street-cars that little need be said here. The fact is that street-cars are too much of a convenience to be dispensed with. That their number might be greatly reduced by affording other and more rapid means of communication between the suburbs and the centre of the city is most probable, and there are able minds now engaged in the evolution of this means of lessening the overcrowding of the streets.

As to the overcrowding of the streets by wagons, there seems to be no immediate prospect of any invention being put in practical operation that would tend to lessen the number of them. The only well-known appliance for transporting packages in cities is the pneumatic-tube system. This if well carried out, of proper size and power, might be made to do a considerable proportion of the transportation now done by wagons. In default of some such contrivance, the most obvious remedy for this kind of overcrowding is to widen the streets, but the expense of doing so would be enormous; indeed, it is generally considered to be absolutely prohibitive.

If some of the principal streets of Boston, upon which the retail trade is now so concentrated, are not widened before long, it is probable that the bulk of the finer retail trade will gradually, and with much friction and pecuniary loss, creep out from the centre of the city into the broader avenues and streets which more liberal-minded men have caused to be laid out, radiating from the city to the south and west. There will, of course, always be a wide distribution of certain kinds of retail business, such as the supplying of provisions, but there are other kinds of retail business which it is a great deal wiser to have mainly concentrated in districts. There may well be secondary centres of retail trade, and, so far as width and convenient location are concerned, Tremont Street, beyond Dover Street, will, in all probability, be well able to meet every requirement of such a subsidiary trade-centre for all time to come. The same may be said of Huntington Avenue. The experience of New York shows clearly that the broadest streets, even when at first occupied by the best class of residences, ultimately become the minor centres of retail trade.

But the question is as to the main centre of the retail trade. By the main centre of the retail trade is meant a locality in which not necessarily the rarest and most costly goods are exclusively sold, but where the great bulk of well-to-do people, both of the city itself and of the suburbs, will always be able to find the largest selection of goods at the lowest prices. Boston distinctly has such a trade-centre, containing the largest stores and daily more crowded with people making purchases than any other part of the city, but it is so crowded, especially the sidewalks, that it seems to have nearly reached the limit of its capacity, and it seems probable that stores on the outskirts of the district may thrive at the expense of those already established in the most eligible spots, mainly because of the approaches to them being less uncomfortably crowded. If what is the most conveniently-situated locality is thus gradually abandoned to wholesale trade and other uses, it would be a real misfortune to the community at large. It would be so not only because of the convenience of the present situation of the main centre of retail trade, but also because it would, in any other place, lose somewhat of its concentrated character. Some of the advantages of concentration of trade are obvious to any one who is familiar with the great dry-goods stores, which not only give the customers the benefit of the reduced percentage of expenses incident to a large business under one organization, but offer a larger selection, newer goods, and lower prices, due to the power of making larger purchases from manufacturers and other causes. Much time and strength is also saved to customers through being able to buy many different things in a single large store. But there are many other advantages in concentration, even when not under one organization. By concentration the greatest

economy in the supplying of small amounts of power is rendered possible; likewise of heat, of electric-light, of telephones, of pneumatic-tubes for despatching parcels from place to place in the city and to distributing-stations in the suburbs, of fine fireproof buildings and the best appliances for preventing or extinguishing fires, of efficient policing, and so on. But perhaps the greatest economy of all is in time. To the community at large, as well as to individuals, whatever arrangements tend to save time are of the utmost importance.

If it be true that the expense of widening some of the most important streets in the liberal way that has been done in Paris, and which has made that city famous as the handsomest, pleasantest and most convenient for shopping of any in the world is prohibitive, there yet remains a method of meeting the difficulty of overcrowded streets in a far less costly way than even the usual moderate widening. That is to add the existing sidewalks to the roadway and to build new and much wider sidewalks through the fronts of the buildings in the form of "arcades." Such arcades exist in the old town of Chester in England, much more systematically and extensively in Turin, and more or less in many other European cities. Such a scheme could be carried out at very moderate expense for construction and the damage to buildings would be slight; in fact, by raising such as had too low a ceiling in the first story, not a single building would have to be torn down. The cellars under the arcade and the floors above it would not necessarily have their usefulness at all interfered with. The damage to property would, practically, consist merely in the taking of so much rentable floor-space. The lessening of the light in the stores on the ground-floor would be amply compensated for by keeping the arcade brilliantly lighted by electric lights day and night at the public expense. No attempt at external architectural unity of design would be necessary, as the finish of the arcade could be made to accord with the style of the buildings through which it passed. The noise of the trampling of many feet could probably be lessened by using a wooden-block pavement, with grain on end: as it would be under shelter, the principal objection to the use of this kind of pavement in streets would not hold. The arcade could be made thoroughly fireproof and automatic-sprinklers and automatic fireproof curtains could be arranged to prevent a fire from spreading along the arcade. The public, in walking through the arcade, would be protected from snow, rain and sun. Many stores, reaching through from street to street, would form covered ways across blocks in addition to the arcade on the cross-streets. The new shop-fronts could be entirely of glass, as no heavy piers would have to be provided at the place where they would come to give the sense of support as well as the reality, an advantage which architects should be quick to appreciate.

There would be a secondary advantage in the arcade scheme hardly less important than that of affording more room to ordinary street traffic; namely, that of economically providing an easily-accessible subway (by taking the portions of the private cellars that would be under the arcade and partitioning them off) in which to place pneumatic-tubes, steam, water and gas pipes, and telephone, telegraph and electric-light wires. It may even not be thought to be a wild suggestion that some day the space under such arcades might come to be used for some form of rapid transit.

The advantages of public arcades in crowded shopping-districts are so obvious to any one who has seen them abroad that it is a matter of wonder that they have not come into use in this country, and especially in Boston, where the streets are so narrow and crowded.

J. C. Olmsted.

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSE OF E. V. R. THAYER, ESQ., LANCASTER, MASS. MESSRS. ANDREWS & JAQUES, ARCHITECTS, BOSTON, MASS.

[Gelatine print, issued only with the Imperial Edition.]

The *American Architect* for August 4th contained a view of this house taken from another point.

COMPETITIVE DESIGN FOR THE NEW MUNICIPAL BUILDINGS, NEW YORK, N. Y. MR. CYRUS K. DEAN, ARCHITECT, ERIE, PA.

DESIGNS MADE BY THE STUDENTS OF THE ARCHITECTURAL DEPARTMENT OF THE UNIVERSITY OF ILLINOIS.

See article elsewhere in this issue.

COMPETITIVE DESIGN FOR A CHURCH AT WAKEFIELD, MASS. MESSRS. WAITT & CUTTER, ARCHITECTS, BOSTON, MASS.

DESIGN FOR WEST END SCHOOLHOUSE, BRIDGEPORT, CONN. MESSRS. LONGSTAFF & HURD, ARCHITECTS, BRIDGEPORT, CONN.

UNITED STATES GOVERNMENT BUILDING PRACTICE.[1]—XII.

ROOF COVERING.

UNDER this heading is generally included everything to complete the roof after the framing and boarding or roof tiles are put on; embracing slating, copper-work of decks, valleys, flashings, tin-work, roof-trimmings, hips, ridges and down-pipes.

On the better class of Government buildings the steep portions of roofs and the roofs and sides of dormers are covered with slate, and the flat or deck roofs with copper; on cheaper buildings tin is used on deck roofs.

Slating. The best known slates are from the Bangor quarries in Maine, Peach Bottom, Pa., and Buckingham, Va., but fine slate is also found in other places, and is generally of a blue-black or dark-purple color and sometimes red.

The steep or mansard portions of roofs, tower-roofs and roofs and sides of dormers are covered with slate.

All roofs whether covered with slate, tin, or copper should be covered with heavy fibre building-paper, or sometimes in best work a coating of one-half Portland cement and one-half coarse, clean sharp sand about 1″ thick is used over terra-cotta roofing tiles.

The slates for large important buildings are generally made 10″ x 20″ x $\frac{5}{16}$″ to $\frac{3}{8}$″ thick, with sawn edges and tails laid with 3″ lap showing 8½″ to the weather: for smaller buildings they are usually made 8″ x 16″ x $\frac{3}{16}$″ average thickness with cut edges and tails 3″ lap and showing 6½″ to the weather. All slates should be secured at waists by two broad headed galvanized wrought-iron nails 1½″ long if on boarding, and by two $\frac{3}{16}$″ bolts on terra-cotta tiles passing through with nut and washer on underside of tile.

The slate on a great many large buildings have been secured directly to the ⌊ or ⊥ bar purlins by heavy copper wire passing through holes in slates and tied around bars; also by Farquhar's patent slate-fasteners (see Figure 43): but since terra-cotta roof-tiles have been used this is discontinued, and bolts passing through slates and tiles are used. The holes in slates for bolts or nails should be countersunk for the heads, in good work.

The slates for circular and conical surfaces should be cut to radiate from the centre or apex, the courses decreasing in width towards the top, and each course should be of a uniform width and properly break joint.

All the slates should have smooth split surfaces, out of wind, with edges and tails cut or sawn straight or square. The lines of slates at valleys, hips, ridges and eaves should be cut straight and the slates

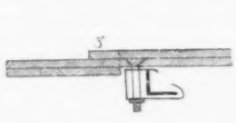


Fig. 43.

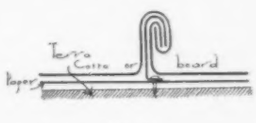


Fig. 44.

have a double course at eaves and ridges, and fit closely to hips. Fitting-pieces should be provided at eaves and against chimneys, etc., to properly throw off the water.

Where slates come against masonry, copper or tin flashings should be worked in between each slate and cap-flashed.

Terra-cotta roof-covering tiles should be secured by bolts or nails

[1] Continued from No. 649, page 262.

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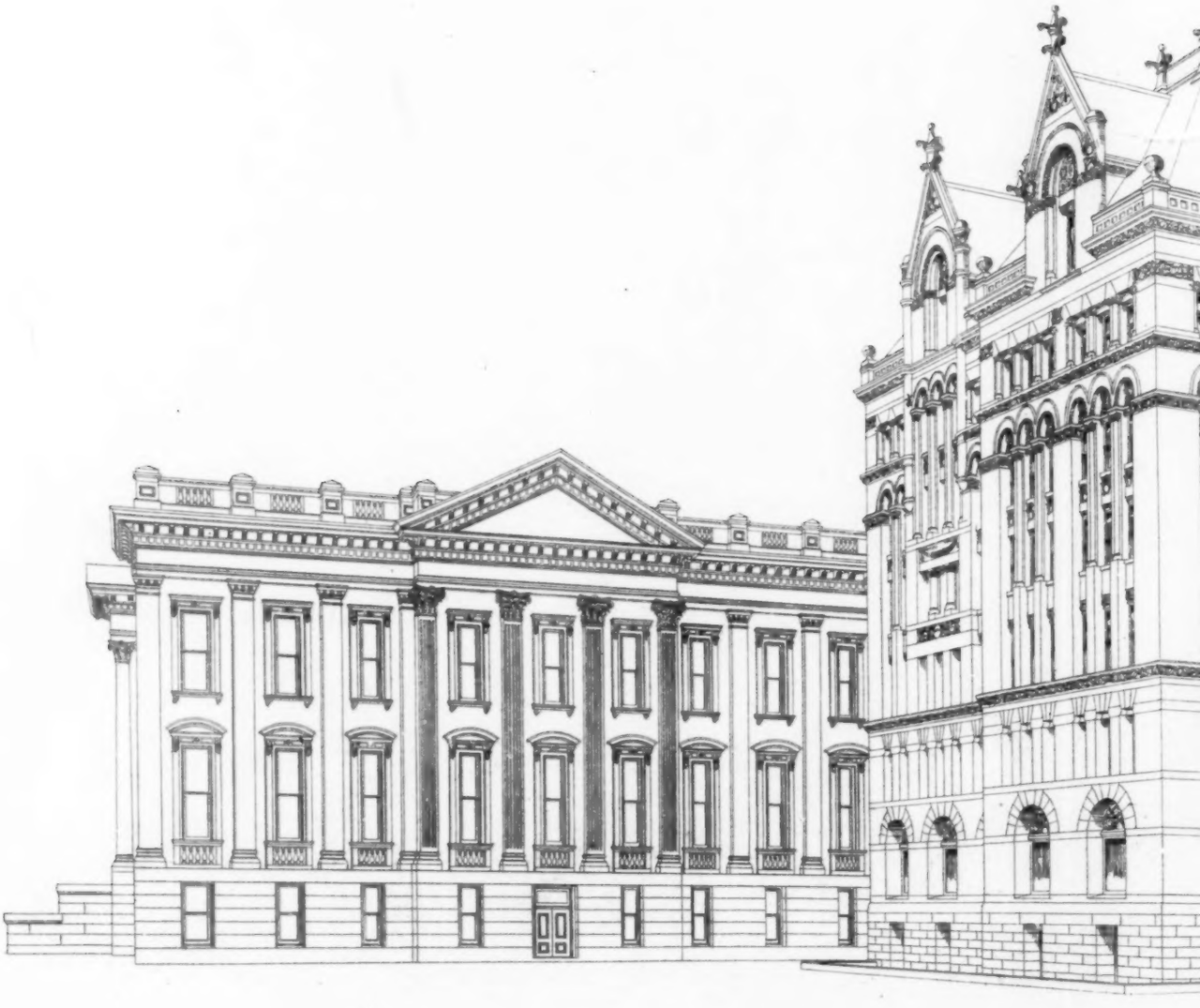
VIEW FROM THE NORTH-WEST.

"VITRUVIUS."

Cyrus F. Dean.

NEW YORK CITY OFFICE COMPETITION.



Heliotype Printing Co. Boston.

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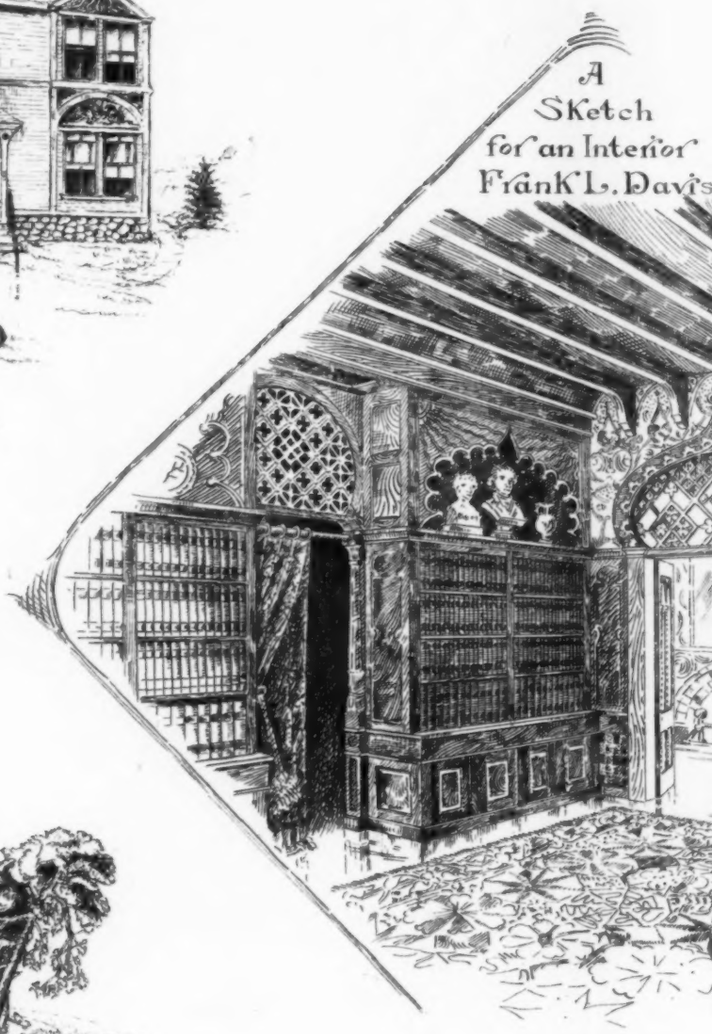
Studies by Architectural Student University of Illinois.

Sketch for A Cottage

G. F. Heimsoth



A Sketch for an Interior

Frank L. Davis

Sketch for a River Side Residence.

by

Geo. R. Potty.

University of Illinois.

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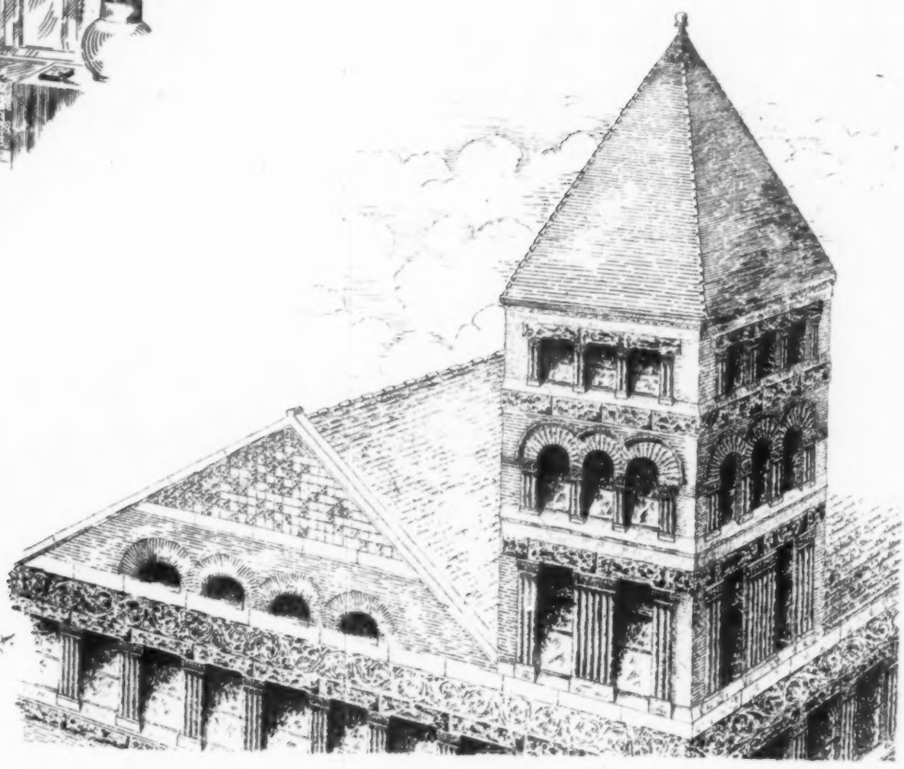
Davis.

A Sketch for A Sea Side Cottage



Sketch of Tower by Houghton

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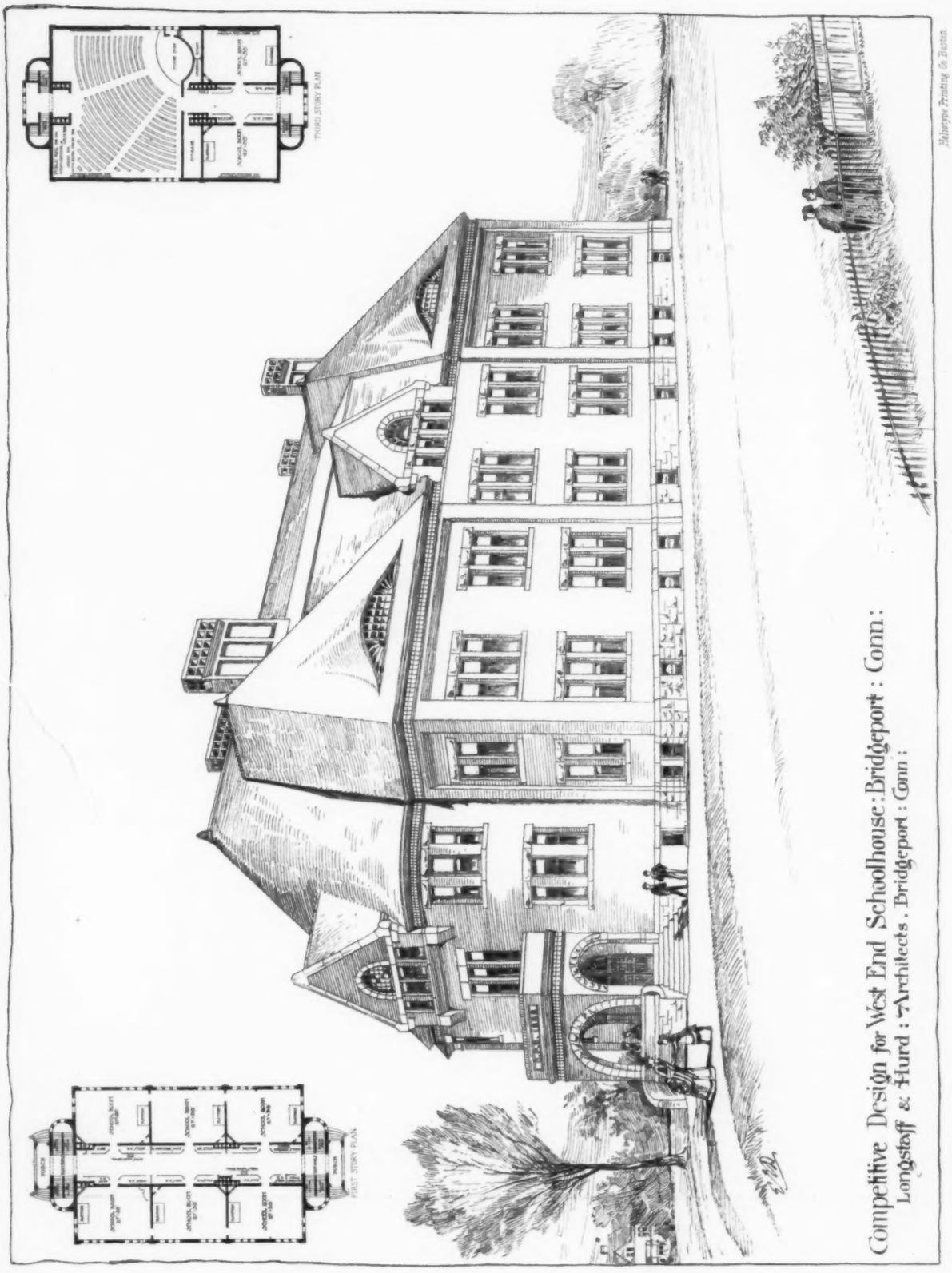


Competitive Design for West End Schoolhouse: Bridgeport: Conn:
Longstaff & Hurd: Architects. Bridgeport: Conn:

in same manner as slates, and where the tiles are plain flat, they should have a proper lap and be laid similarly to slates in every way. These tiles have the advantage over slate, in that if the slates are heated by fire and water is thrown on them, they are apt to split and crack, but the tiles will not.

Copper and Tin Work. Copper and tin are used for deck or flat roofs, gutters, valleys and flashings, and are secured in place in the same way. Copper is used for the better class of work, being much more expensive than tin, and in any event is generally used for gutters, valleys and flashings.

Sheet-lead and zinc have been seldom used and then they have not proved satisfactory.

Copper for flat or deck roofs is generally made 12 ounces to 14 ounces per square foot, and for gutters, valleys and flashings 14 ounces to 18 ounces per square foot, being required heavier for northern than for southern climates.

Tin for deck roofs is generally made IXX charcoal tin, sometimes IX, in sheets 14″ x 20″, and for gutters, valleys and flashings IXX in sheets to suit the widths required.

The joints for both copper and tin are generally made standing for those running up the incline of the roof secured by either copper or tin tags nailed to boards or terra-cotta plates, or embedded in cement spaced every 12″, and the upper ends worked into the seams as per Figure 44, and in best work the joints riveted ever 2½″ apart: the horizontal joints to be flat double-locked, well-soldered and perfectly watertight.

The joints in gutters and valleys should also be double-locked and soldered. The standing joint is better than the flat for running up the incline, as it allows more expansion and contraction, but flat joints of course are necessary for the horizontal ones. Great care should be taken to allow for expansion and contraction where there is much variation in the temperature of the climate.

The copper should always be tinned on upper side, where the drain-water from roof is to be carried into a cistern for use, and as tinning costs only about 3 cents to 5 cents per square foot, this should always be done, as at some future time the roof-water might be used.

Flashings. Against all masonry etc., flashings should be worked in between slates, or tiles turned up against masonry at least 4″, and have a cap or apron flashing let into joint of brick-work or into chase cut in the stonework, caulked with lead on the underside, and turned down over the under-flashing, the edge being at least 1″ above slates. Projecting courses of stone or brick are frequently cap-flashed with copper, tin or galvanized iron: the metal to be let into joint above course, extend over and turned up under nosing or crown-mold, or sometimes secured to galvanized-iron strip as hereafter described for gutter.

The valley flashing should be one piece of metal its entire width, and should extend from 10″ to 16″ each side of angle, and have slates overlap it 4″, with the horizontal joints double-locked and soldered, and the flashing nailed on each side to boarding or porous roof-tiles every 12 inches.

Gutters. Gutters are generally formed on top of stone or brick walls, by angle-irons set up for the front, secured to masonry by expansion-bolts, or to wood strips built in the brickwork and nailed

Fig. 45.

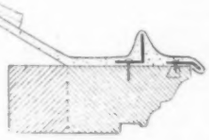


Fig. 46.

to look-outs, the lining should be in one piece the entire width of gutter, and in as long lengths as practicable; it should extend up the roof under the slates or roof-covering higher than the front edge so that in case down-pipes become stopped up, the water would overflow and not get inside the building. The front edge of gutter is generally secured to stonework by having a galvanized sheet-iron strip No. 16 B. W. G., 3″ or 4″ wide continuing the whole length of gutter secured to stone every 12″ by ¼″ diameter expansion bolts or screws leaded in, but these should be placed far enough from the edge not to chip it off by expansion (see Figure 46). The gutters should have a grade, towards outlets formed in wood or cement, not less than ½″ in 10′ 0″.

Gutters formed in stone should be lined, or have joints between stones protected by metal, caulked on each side with lead into stone, and jointed and soldered as per Figure 47.

Wherever nails are required for nailing gutters, valley flashings etc. to woodwork, they should be copper, galvanized-iron or tinned nails, their heads cap-flashed and all soldered perfectly watertight. All joints should be soldered, and riveted where possible.

Outlets. — Bell-shaped 16-ounce copper outlets should be formed in gutters twice the area of down-pipes, securely joined and soldered to gutters, and to 16-ounce copper goosenecks which are to be properly connected with the iron down-pipes on the inside of the wall; the outlets to be covered with copper, or galvanized-iron wire hemispherical gratings to prevent débris getting into the pipes. The down-pipes from gutters if carried down on inside of wall in chases, should be cast-iron hub-pipe 4″ diameter thoroughly tarred inside and out, the joints to be made with oakum run with molten lead and caulked watertight; or in more expensive and better work wrought-iron screw-joint pipes 3″ diameter tarred inside and out, with screw-joint connections. The iron pipes should have elbow at bottom and rest on brick piers and secured every 4′ 0″ to brickwork in chase by pipe-hooks and connected either to horizontal drain and soil-pipes in basement; or carried through wall below first floor, with ornamental mouthpiece to discharge on drip-stone for surface drainage.

Fig. 47.

The pipes if brought down on outside of wall should be copper or galvanized-iron 3″ to 4″ diameter or squared 3″ by 4″ secured to wall every 4′ 0″ and have mouthpiece for discharging on drip-stone, or entering cast-iron pipes 5′ 0″ above grade for connection to drain or soil pipes.

Roof Trimmings. — The roof trimmings, that is, gutter fronts, crown moulds of cornice, hips, ridges, deck-cornices, dormer-cornices etc., are most always made of galvanized-iron or copper on wood roofs, and frequently on iron roofs. Copper for these trimmings is more durable provided it is well braced and has strong framing for support, but is not so stiff and is more expensive than galvanized-iron. The weight of copper used varies from 16 ounces per square foot for light trimmings to 24 ounces, for heavy moulded and ornamental trimmings; galvanized-iron varies from No. 26 B. W. G., about $\frac{1}{16}$ of an inch thick, for hips, ridges and small cornices to No. 16 B. W. G., about $\frac{1}{16}$ of an inch thick, for heavy crestings, cornices, finials, dormer fronts, etc. The sheets of copper or galvanized-iron should have the uneven edges trimmed off and should be perfectly uniform in thickness, and heavily rolled to remove any inequalities, cavities or blisters from the surface.

All trimmings should be thoroughly braced and supported by and riveted to cast-iron brackets (if on an iron roof) every 3′ 0″ apart riveted or bolted to the iron work; or (if on a wood roof) should be supported on wood blocking or cores on the interior closely following the moulded contours of the galvanized-iron or copper, which is to be strongly nailed to the wood. All joints and connections should be properly lapped not less than 3″, riveted wherever practicable and thoroughly soldered. Galvanized iron or copper nails should be used for securing to framing or woodwork, the heads to be capped and soldered all perfectly watertight.

Painting. — All the exposed galvanized-iron, tin and metal work should be painted one good coat of metallic paint, or red lead and linseed oil; the portions which are ornamental to have two additional coats of approved tints. The copper work when untinned should not be painted, especially where the natural color of the copper is intended to have an architectural effect.

MEASUREMENT.

Slating and roof-covering tiles are generally estimated by the square = one hundred square feet of roof laid, the actual net roof-surface should be obtained allowing only sufficient amount for wastage, caused by cutting at valleys and against hips for fitting; no allowance is made for the double courses at eaves and ridges.

Copper and tin for roofs is also measured and estimated by the square, taking extreme measures for surface and allowing for wastage at valleys and hips.

Copper and tin flashings and gutters are generally estimated by the lineal foot, giving extreme measures at all external and internal angles, giving the girth and method of securing.

Copper and galvanized-iron hips, ridges, crestings, cornices, etc. are generally estimated by the lineal foot, giving girth, contour, designs and manner of securing in place.

Dormer fronts in copper or galvanized-iron are generally estimated by the square foot, taking net surface as near as practical and allowing for wastage in cutting, in the price.

Finials are estimated by the piece giving design and dimensions.

COST.

Roofing-paper which should form a base for all roof-covering is generally 2 or 3 ply felt, well tacked down with 1″ diameter tin washers and coated with asphalt: it costs from $2.00 to $2.50 per square for 2-ply felt, and $2.75 to $3.00 for 3-ply felt.

Slating costs from $9.00 per square for small slates with cut edges nailed to boards, up to $18.00 and $20.00 per square for best quality large slate with sawn edges and secured on terra-cotta roof-tiles. The slates for the custom-houses at Albany, N. Y., Cincinati, O., Harrisburg, Pa., Philadelphia, Pa., and Memphis, Tenn., and for the Barge Office in New York City, were 10″ x 20″ x ¼″ to ⅜″ thick sawn edges and secured by Farquhar's patent galvanized-iron fasteners, and cost from $27.00 to $30.50 per square.

Terra-cotta roof-covering tiles are made up from ¼″ to ⅜″ thick; the plain flat ones secured like slates cost from $12.00 to $15.00 per square, and the ornamental ones cost a little more, dependent on sizes, lugs, shoulders, etc., which are made on the tiles and the designs.

Tin roofing costs from about $5.50 per square for IX charcoal tin, to $6.50 and $7.00 for IXX tin.

For flashings and gutters about ¼ to ½ additional cost should be allowed for the labor and securing same in place.

The cost of copper-roofs depends almost entirely on the price of copper; the labor of working it is less than either tin or galvanized-iron. Copper was very expensive until 1885 and 1886, when the cost fell to 15 cents and 17 cents per pound, when the cost of roofing was from $18.00 to $22.00 per square, dependent on the weight per square foot, and the sizes of the sheets: it has advanced again in price to 28 cents and 31 cents per pound, and roofing now costs from $33.00 to $36.00 per square.

Plain galvanized-iron for trimmings costs from 16 cents to 22 cents per square foot, the trimmings put in place complete, cost from 30 cents to 50 cents per square foot, dependent on mouldings and ornamentation.

Jas. E. Blackwell.

CIRCULAR

OF THE COMMITTEE OF CONFERENCE OF THE AMERICAN INSTITUTE OF ARCHITECTS, THE WESTERN ASSOCIATION OF ARCHITECTS, AND THE NATIONAL ASSOCIATION OF BUILDERS ON A STANDARD FORM OF CONTRACT.

Dear Sir, — The Committee of Conference on a Standard Form of Contract, appointed at their last Annual Conventions by the several Associations above named, beg leave to present the accompanying specimen copy of such Contract as the result of their united labors in that behalf, and respectfully ask its adoption by you in your practice.

The object sought to be obtained by the Committee was to prepare a Form of Contract which could be received and adopted generally by architects and builders as a Standard Form, and in which the several provisions necessary to constitute an equitable agreement, as between the owner and the builder, would be incorporated. The Joint Committee were empowered by their respective Associations to prepare and adopt such a Form of Contract, and this work, as embodied in the accompanying printed copy, may be said to be the authorized Standard Form of said Associations.

The action of the Committee in this regard was as follows: After an exchange of views through correspondence, an arrangement was made to have the Committee meet in the City of New York. Accordingly such a meeting took place on the sixth of June ult., and an organization was effected by electing a Chairman and Secretary. This meeting was adjourned from day to day — daily sessions and one evening session being successively held — until the labors of the Committee were essentially completed. The matter was then referred to a sub-Committee, consisting of the Chairman and Secretary of the Joint Committee, to revise the manuscript for publication. It was afterwards submitted individually to the several members of the Committee, subjected again to another revision, and finally adopted as printed.

In order to preserve the Form from errors, alterations or interpolations, it has been copyrighted. It is the general intention of the members of the National Association of Builders' to have it understood that in all cases where proposals for any work are submitted by them, such proposals are made with the understanding that the contract made upon this Standard Form is the one that is to be executed by them upon such proposals.

The Inland Publishing Company, 19 Tribune Building, Chicago, Ill., has been licensed to publish the blanks, and any number of copies, with prices, etc., can be obtained from them on application. The blanks will be furnished at $1.10 per 100, $4.25 per 500, and $8 per 1,000, free by mail or express. Architects can have their names and the consequent pronouns inserted, as they may order, at small additional cost.

The members of the Committee of Conference, appointed by their several Associations, are as follows:

Of the American Institute of Architects.	O. P. Hatfield, New York, N. Y. Alfred Stone, Providence, R. I. J. H. Windrim, Philadelphia, Pa.
Of the Western Association of Architects.	S. A. Treat, Chicago, Ill. W. W. Clay, Chicago, Ill. J. F. Alexander, Lafayette, Ind.
Of the National Association of Builders.	John S. Stevens, Philadelphia, Pa. George C. Prussing, Chicago, Ill. John J. Tucker, New York, N. Y.

O. P. Hatfield, *Chairman.*

Wm. H. Sayward, *Secretary,*
164 Devonshire St., Boston.

New York, August 8, 1888.

FORM OF CONTRACT ADOPTED BY THE JOINT COMMITTEE OF THE AMERICAN INSTITUTE OF ARCHITECTS, THE WESTERN ASSOCIATION OF ARCHITECTS AND THE NATIONAL ASSOCIATION OF BUILDERS.

—— *Architect* .

This Agreement, made the —— day of —— in the year one thousand — hundred and —— by and between —— part of the first part, (hereinafter designated the *Contractor* ;) and —— part of the second part (hereinafter designated the *Owner* ;)

Witnesseth that the Contractor , being the said part of the first part, in consideration of the covenants and agreements herein contained on the part of the Owner , being the said part of the second part, do covenant, promise and agree with the said Owner , in manner following, that is to say:

1st. The Contractor shall and will well and sufficiently perform and finish, under the direction, and to the satisfaction of —— Architect (acting as Agent of said Owner), all the work included in the —— agreeably to the drawings and specifications made by the said Architect , and signed by the parties hereto, (copies of which have been delivered to the Contractor), and to the dimensions and explanations thereon, therein and herein contained, according to the true intent and meaning of said drawings and specifications, and of these presents, including all labor and materials incident thereto, and shall provide all scaffolding, implements and cartage necessary for the due performance of the said work.

2d. Should it appear that the work hereby intended to be done, or any of the matters relative thereto, are not sufficiently detailed or explained on the said drawings, or in the said specifications, the Contractor shall apply to the Architect for such further drawings or explanations as may be necessary, and shall conform to the same as part of this contract, so far as they may be consistent with the original drawings, and in event of any doubt or question arising respecting the true meaning of the drawings or specifications, reference shall be made to the Architect , whose decision thereon, being just and impartial, shall be final and conclusive. It is mutually understood and agreed that all drawings, plans and specifications are and remain the property of the Architect .

3d. Should any alterations be required in the work shown or described by the drawings or specifications, a fair and reasonable valuation of the work added or omitted, shall be made by the Architect , and the sum herein agreed to be paid for the work according to the original specification, shall be increased or diminished as the case may be. In case such valuation is not agreed to, the Contractor shall proceed with the alteration, upon the written order of the Architect , and the valuation of the work added or omitted shall be referred to (3) three Arbitrators (no one of whom shall have been personally connected with the work to which these presents refer), to be appointed as follows: one by each of the parties to this contract, and the third by the two thus chosen; the decision of any two of whom shall be final and binding, and each of the parties hereto shall pay one-half of the expenses of such reference.

4th. The Contractor shall within twenty-four hours after receiving written notice from the Architect , to that effect, proceed to remove from the grounds or building, all materials condemned by , whether worked or unworked, or take down all portions of the work which the Architect shall condemn as unsound or improper, or as in any way failing to conform to the drawings and specifications, and to the conditions of this contract. The Contractor shall cover, protect and exercise due diligence to secure the work from injury, and all damage happening to the same by neglect, shall be made good by

5th. The Contractor shall permit the Architect , and all persons appointed by the Architect , to visit and inspect the said work or any part thereof, at all times and places during the progress of the same, and shall provide sufficient, safe and proper facilities for such inspection.

6th. The Contractor shall and will proceed with the said work, and every part and detail thereof, in a prompt and diligent manner, and shall and will wholly finish the said work according to the said drawings and specifications, and this contract, on or before the —— day of —— in the year one thousand —— hundred and —— (provided that possession of the premises be given the Contractor , and lines and levels of the building furnished him, on or before the —— day of —— in the year one thousand —— hundred and ——), and in default thereof the Contractor shall pay to the Owner —— dollars for every day thereafter that the said work shall remain unfinished, as and for liquidated damages.

7th. Should the Contractor be obstructed or delayed in the prosecution or completion of the work by the neglect, delay or default of any other contractor; or by any alteration which may be required in the said work; or by any damage which may happen thereto by fire, or by the unusual action of the elements, or otherwise; or by the abandonment of the work by the employees through no default of the Contractor , then there shall be an allowance of additional time beyond the date set for the completion of the said work: but no such allowance shall be made unless a claim is presented in writing at the time of such obstruction or delay. The Architect shall award and certify the amount of additional time to be allowed; in which case the Contractor shall be released from the payment of the stipulated damages for the additional time so certified and no more. The Contractor may appeal from such award to arbitrators constituted as provided in Article 3d of this contract.

8th. The Contractor shall not let, assign or transfer this contract, or any interest therein, without the written consent of the Architect .

9th. The Contractor shall make no claim for additional work unless the same shall be done in pursuance of an order from the Architect , and notice of all claims shall be made to the Architect in writing within ten days of the beginning of such work.

10th. The Owner agree to provide all labor and materials not included in this contract in such manner as not to delay the material progress of the work, and, in the event of failure so to do thereby causing loss to the Contractor , agree that will reimburse the Contractor for such loss; and the Contractor agree that if shall delay the material progress of the work so as to cause any damage for which the Owner shall become liable (as above stated), then shall make good to the Owner any such damage — over and above any damage for general delay herein otherwise provided; the amount of such loss or damage, in either case, to be fixed and determined by the Architect , or by arbitration, as provided in Article 3d.

11th. The Owner shall effect insurance on said —— work, in his own name and in the name of the Contractor , against loss or damage by fire, in such sums as may from time to time be agreed upon with the Contractor , the policies being made to cover work incorporated in the building, and materials for the same in or about the premises, and made payable to the parties hereto, as their interest may appear.

12th. Should the Contractor at any time refuse or neglect to supply

a sufficiency of properly skilled workmen, or of materials of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the agreements on part herein contained, such refusal, neglect or failure being certified by the Architect , the Owner shall be at liberty, after three days written notice to the Contractor , to provide any such labor or materials, and to deduct the cost thereof from any money then due or thereafter to become due to the Contractor under this contract; and if the Architect shall certify that such refusal, neglect or failure is sufficient ground for such action, the Owner shall also be at liberty to terminate the employment of the Contractor for the said work and to enter upon the premises and take possession of all materials thereon, and to employ any other person or persons to finish the work, and to provide the materials therefor; and in case of such discontinuance of the employment of the Contractor he shall not be entitled to receive any further payment under this contract until the said work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expense incurred by the Owner in finishing the work, such excess shall be paid by the Owner to the Contractor , but if such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner . The expense incurred by the Owner as herein provided, either for furnishing materials or for finishing the work and any damage incurred through such default, shall be audited and certified by the Architect , whose certificate thereof shall be conclusive upon the parties.

13th. And it is hereby mutually agreed between the parties hereto, that the sum be paid by the Owner to the Contractor for said work and materials shall be —— subject to additions or deductions on account of alterations as herein before provided, and that such sum shall be paid in current funds by the Owner to the Contractor in instalments as follows:

It being understood that the final payment shall be made within ——— days after this contract is completely finished, provided, that in each of the said cases the Architect shall certify in writing that all the work upon the performance of which the payment is to become due has been done to satisfaction; and provided further, that before each payment, if required, the Contractor shall give the Architect good and sufficient evidence that the premises are free from all liens and claims chargeable to the said Contractor ; and further, that if at any time there shall be any lien or claim for which, if established, the Owner or the said premises might be made liable, and which would be chargeable to the said Contractor , the Owner shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient to completely indemnify against such lien or claim, until the same shall be effectually satisfied, discharged or cancelled. And should there prove to be any such claim after all payments are made, the Contractor shall refund to the Owner all moneys that the latter may be compelled to pay in discharging any lien on said premises, made obligatory in consequence of the former's default.

14th. It is further mutually agreed between the parties hereto, that no certificate given or payment made under this contract, except the final certificate or final payment, shall be conclusive evidence of the performance of this contract either wholly or in part, against any claim of the Owner , and no payment shall be construed to be an acceptance of any defective work.

15th. And the said Owner hereby agree with the said Contractor to employ, and hereby employ to provide the materials and to do the said work according to the terms and conditions herein contained and referred to, for the price aforesaid, and hereby contract to pay the same, at the time, in the manner, and upon the conditions above set forth.

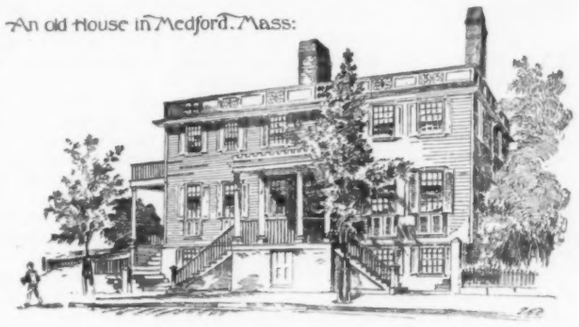
16th. And the said parties for themselves, their heirs, executors, administrators and assigns, do hereby agree to the full performance of the covenants herein contained.

In Witness Whereof, the parties to these presents have hereunto set their hands and seals, the day and year first above written.

In presence of

MR. RUSKIN'S MUSEUM AT SHEFFIELD. — Half-a-dozen years have passed since Mr. Ruskin offered to Sheffield all his art treasures, providing the town would find a suitable building for their preservation. He even went further in his spirit of munificent liberality by undertaking to personally superintend the arrangement of the objects in the museum, and be responsible for its management during his lifetime. It was proposed that the new building should be built at Endcliffe, one of the most beautiful spots within the boundaries of the old town. Money was not wanting; £10,000 were subscribed; plans were prepared and the design was admitted by Sheffield experts to excel anything they had thought possible. Then an irritating obstacle occurred. Matter-of fact municipal magnates intervened. They did not understand the nature and purposes of the St George's Guild, and distrusting its continuance, made it a condition of subscription that the museum should be satisfactorily guaranteed to Sheffield forever. Technical difficulties arose as to the title and the nature of the guaranty that the museum should remain the inviolable and permanent possession of the town. Mr. Ruskin has a scornful contempt for superficialities, and he cannot bring his mind down to legal hair-splitting. He declined to read any further lawyer's quibbles, and his indisposition left the matter in abeyance. It is satisfactory, however, to know that the settlement of the whole question will no longer be delayed, and that soon the new building will rise in all its fair proportions Mr. Ruskin has deputed the trustees to cut the Gordian knot by telling the lawyers to draw up a conveyance between the mayor and corporation of Sheffield and the St. George's Guild, The pictures and objects, as well as the building, are to remain the property of the public forever. The new museum will be a splendid memorial to its founder, and a permanent embodiment of his ideas. May he long be spared to advise in all its counsels and to direct its resources. — *Magazine of Art.*

THE EXCAVATIONS AT SYBARIS.



WHILE the discoveries at Sybaris have not been, as it was at first believed, those of the Greek city destroyed five centuries B. C., they have disclosed an interesting prehistoric fact — namely: that prior to the existence of the Greek Sybaris there was on the site which the Greek colonists, after the fashion of those days, appropriated and built a new city on, an Italic city, the necropolis of which, in an apparently undisturbed state, has been found, and which contains remains due to an archaic civilization so precisely corresponding to those found in other parts of the peninsula — at Vetulonia, at Civita Castellana, Corneto, and various more northern points — as to add to the evidence of a general Italic civilization prior to the Etruscan, and extending over the entire peninsula.

I had the pleasure not long since of visiting the excavations now going on at Corneto with Professor Helbig, who is the official director in that district, and saw, with the advantage of his elucidation, the results of the late important explorations. The discovery, on the site of the well-known and long-explored Etruscan necropolis, of the earlier form of tomb, the so-called *pozzi* or well-tombs with the strange mingling of Oriental and native arts, the hut-urns, with arms of scarcely questionable Eastern origin, seriously impugned previous archæological conclusions. The hut-urns containing incinerated human remains, and originally found on the Alban Mount under two strata of volcanic ashes, were regarded as the earliest evidence of human residence in Italy, and as belonging to the Latin as distinguished from the Etruscan inhabitants. They belong to the well-tombs mainly, and have since their discovery in the centre of Latium been found in places so widely sundered that they must, at all events be accepted as not merely Latin but Italic, whether this word implies more or less than Etruscan. The admirably systematic manner of making the excavations now followed, so different from the old system, gives each article found its proper value, and the absolute connection is thus made clear between the hut-urns and the objects of bronze found with them. Among the latter are helmets of the most skilful fabric and swords of both bronze and iron, while the former are the rudest forms of pottery, hand-made and only half-baked, and what is most singular, in some tombs are copies of the helmets in clay, made as covers to the round urns, a use to which the original bronze helmets seem to have been put after the death of the owner. In the same necropolis with these are found the "corridor" tombs, and the latest and best-known form of the Etruscan tomb, the "chamber," the paintings on some of which at Corneto are celebrated, and form a series coming down to Roman times.

The apparent solution of the puzzle is that here were three stages of civilization following each other on one site. Helbig, on the contrary, is of the opinion that the three are only phases of one civilization, and that Etruscan; and that to a certain extent they overlapped in the manner of disposing of the dead, but that there was in no case a break, such as would be caused by the intrusion of a strange race introducing new arts. The bronze arms and implements he considers Phœnician and of Carthaginian origin, and, as he would not admit a greater antiquity to them than about 900 B. C., they would nearly coincide in date with the generally assigned date of the entry of the Etruscans into Italy. But their identity with the articles found at Sybaris, where the Etruscans did not reach, and the evidences of a much greater antiquity in certain implements found in the remains of the lake dwellings, which are almost or quite identical with those found at Sybaris, though found in the extreme north of Italy, make this solution very difficult to accept; and though one does not like to hold out against the immense erudition of Helbig, still the facts are there, and even when we owe them to him we have the right to draw our own conclusions. At a recent meeting of the Institute there were shown bronzes from a lake deposit which the excavator assured me were, by the evidence of the geological record, not later than 1500 B. C., and were of most exquisite casting, and of form similar to those found at Sybaris. And against the opinion of Helbig we have that of all the Italian archæologists, who regard the evidence as conclusive in favor of an Italic civilization prior to the Etruscan. — *London Times Rome Correspondence.*

BOOKS AND PAPERS

RECORDS of tests of building materials are always interesting to architects, epecially such experiments as have to do with masonry and masonry materials. When a series of tests is conducted and the results compiled by so eminent an authority as the late General Gillmore, the results are such as cannot fail to be of value. In some respects the title of General Gillmore's recent work[1] is a misnomer in that it would seem to indicate a larger series of experiments with actual masonry constructions than is actually recorded. The experiments having to do with piers form of themselves a very small portion of the volume, and the bulk of the work is taken up with experiments made on small cubes of various materials.

The tests were made at the Watertown Arsenal, near Boston, with the aid of the 800,000 pound testing-machine. In the introduction there is a quite extended reference to a series of tests made at Staten Island in 1875 by General Gilmore. The results in this case present some curious facts in regard to the nature of the bearing surfaces brought against the material to be tested. Thus it was found in testing such stones as granite, East Chester marble and blue Berea sandstone, that the ultimate resistance of the samples crushed between either steel bearings, wooden blocks, lead sheets or leather pads was in the ratio of: Steel, 100; wood, 94; lead, 65, and leather, 60. With a series of stones which were less compact than the first, the proportions were: Steel, 100; wood, 82; lead, 65, and leather, $63\frac{5}{10}$. General Gillmore explains the reason for these differences by assuming that the softer materials such as wood, lead, etc., under great pressures tend to force their way into the pores of the stone, and to act like wedges to split it apart, whereas the steel is more nearly homogeneous and exerts nothing but a direct pressure on the sample. The deduction which might reasonably be made from this fact is in direct opposition to an old idea of inserting lead-bearing plates between the bedstone and bottom plates of iron columns. If General Gillmore's assumptions are correct, lead plates so used would tend to weaken rather than increase the effective resistance of the pier.

In testing the samples, General Gillmore devised a very efficient way for bringing out the full resistance of the material. The bed-plates of the testing-machine are as nearly absolutely parallel and plane as human mechanism can make them, but it is almost impossible to make any sample of stone absolutely parallel and plane between their faces, and if there be any inequality in the surfaces the subsequent pressure of the machine would be apt to split it rather than crush it. The device adopted was to place the sample in position between the bearing plates of the machine and bring upon it only sufficient pressure to hold it from slipping, the testing machine acting horizontally. Thin plaster-of-Paris paste was then poured in at the joints until every cavity between the beds of the sample and the iron plates was thought to be filled. The plaster was allowed to harden for twenty-four or thirty-six hours, and the pressure then applied.

In some previous experiments General Gillmore had ascertained that the results of tests indicated not only that the slabs of stones increased in resistance per square inch as their surfaces increased, but also that the strength per square inch of cross-section of cubes increased with their size, although in a lesser ratio; that is to say, if the 2″ cube will break under an average load of 50,000 pounds per square inch, samples of twice the area of cross-section would stand considerably more than twice the load. General Gillmore worked out a formula to express this:

$$y = a\sqrt[3]{x}$$

in which a is the pressure in pounds required to crush a one inch cube; x the side of any cube expressed in inches, y the pressure in pounds per square inch of bed-surface needed to crush it. In other words, with cubes of the same material the crushing resistance per square inch of pressed surface increases approximately in the ratio of the cube roots of the respective cubes.

Subsequent experiments have not shown this rule to be absolutely correct. It is a theoretical equation, and one which could hardly be applied to large blocks or piers unless the material were as homogeneous in large masses as in the small unit block. A comparatively large cube ceases to be a unit, and is rather a conglomerate of smaller irregular pieces joined together by cementing substances of varying strength, and perhaps slightly separated by minute cracks, cavities or pores. Under such conditions the stone cannot develop the same strength as if it were a true unit. It is known, and has been proved by tests made at the Watertown Arsenal, that a cube built up in several courses is inferior to a solid cube in strength.

Another interesting fact brought out by the Watertown experiments is that the compressive strength of prisms increases as their height diminishes. The same is true of the tensile strength of iron, steel or other metals. The breaking strain is materially affected by the shape of the specimen. General Gillmore has undertaken to work out a formula to express the variation in the strength in the different sizes of cubes. The formula[2] he gives is:

$$W = C + 2\,m \times (h - h_1)^2 \times \sqrt{p}$$

in which:

W = crushing load of prism in pounds.

C = crushing load of a cube having the same area of bed as the prism.

m = crushing load of material per square inch; an average derived from testing a series of cubes of various sizes, and of the same material as the prism.

p = quotient obtained by dividing the area of the bed by the sum of the areas of the sides of the prism.

h = height of cube of crushing strength C in inches.

h_1 = height of prism in inches.

By actual experiments it was found that with an 8″ x 8″ prism 4″ high the crushing load averaged 547,264 pounds, whereas an 8″ x 8″ cube two inches high could not be broken by the maximum load of the testing-machine, 800,000 pounds. A 4″ x 4″ x 3″ sample crushed at 106,856 pounds, whereas a 4″ x 4″ x 1″ sample required 262,840 pounds to crush it. The deduction we would make from this, though such deduction is not made by General Gillmore, is that any such tests as he has made are absolutely of no value in determining the strength of masonry piers, for it is very seldom that the height of the pier is less than ten or twelve times its diameter, and in such cases, where the substance is perfectly homogeneous like granite or marble, General Gillmore's tests would be no criterion of the strength.

General Gillmore refers to the fact that the strength of concrete varies considerably, depending upon the conditions of setting; and he quotes some English experiments to show that twelve-inch concrete cubes rammed into moulds, resisted under compression an average of thirty per cent more than concrete cubes of the same size made in the ordinary way. It was also found that twelve-inch cubes set in water for one year stood a greater weight than those set in air during the same length of time; while six-inch cubes were stronger set in air than in water.

After making a number of tests of individual blocks of stone, one interesting series of tests was made on compound prisms formed of the bases that could not be broken singly. It was found that three twelve-inch freestone cubes, which had singly resisted the maximum load of 800,000 pounds, when compounded as a pier with dry joints yielded with a reverberating explosion under an ultimate pressure of 748,000 pounds. A 10″ x 10″ which had been previously unbroken, yielded when compounded with two 12″ x 12″ x 2″ prisms each equally refractory, under a stress of 654,000 pounds. General Gillmore does not attempt to draw any deductions from these experiments, but simply mentions them as interesting, and leaves his readers to draw their own inferences. If the stones had been thoroughly bedded in good cement, the results would have been quite different. There are some valuable experiments recorded having in view to ascertain the elastic limit of stones; and, as the result of this investigation, it is stated that the elastic limit of freestone cubes averages about sixty-five per cent of their ultimate resistance. This would, of course, be considered in determining the practical resistance of building stones. There are also some further experiments of great interest on the subject of the resilience of various stones from which General Gillmore deduces the proposition that "*when the area of impact is equal to the area of bed surface, the resilience of hard and rigid material like stone, when in the shape of prisms of the same form and area of cross-sections, but of varying heights, becomes greater as the height of the prisms increases.* On the other hand, the capacity to resist loads decreases with the increasing height of the specimen, but increases when the height or thickness is reduced, this increase being specially rapid when the height of the prism is less than one-half the height of a cube of the same cross-section."

It is to be regretted that the part of the volume which, to architects would have the most practical value, that is to say, tests of actual piers should be so slightly treated. The sets of piers tested were all of the same size, one and one-half brick in cross-section and six courses high, built up of common, hard, North River brick, laid in hydraulic mortar made of one part Newark Company's Rosendale cement and two parts sand. The mortar joint averaged about three-eighths of an inch thick. Each pier had a base and cap of North River bluestone of same cross-section as the pier, with the bed-faces rubbed smooth and plane. The height of the brickwork between the bluestone varied from sixteen and one-half inches. The length of the piers varied from twenty-two to twenty-three and a quarter inches, including the end of the stones. The age of the piers when broken was one year and nine months. The crushing strength varied from 250,000 to 291,000 pounds and averaged 266,587 pounds, equivalent to 185 pounds per square inch, or 133 tons (119 gross) per square foot.

While it would be impossible with any testing-machine at present constructed to experiment upon larger piers than the size which General Gillmore adopted, we cannot feel that the tests or records are in any sense final or such as can be used as criterions for piers such as are customarily met with in large buildings.

[1] "*Notes on the Compressive Resistance of Freestones, Brick Piers, Hydraulic Cements, Mortars and Concretes.*" By Q. A. Gillmore, Ph.D. New York: John Wiley & Sons.

[2] It seems to us that the formula would be more correctly stated if it were written

$$W = C + 2m\,(h - h_1)^3\sqrt{p}$$

a slight difference which might make a great difference in the result.

General Gillmore does not state whether the brick piers failed by reason of the brick crushing or the cement giving way; he states, however, that the brick piers were stronger than concretes made with Newark Company's Rosendale cement, and the mortars and concretes made with Norton's cement, but weaker than those made with National Portland cement.

General Gillmore's work is not of so practical value as his former volume on "*Limes, Cements and Mortars.*" It is more tentative, more pedantic in its argument and less direct; but so far as it goes it is a valuable addition to the library of an architect or an engineer. Still, it really adds very little to the literature of the profession. Such tests as he made are not very practical in their results. It is not possible to reason from a small cube to a huge wall or pier, neither has the opportunity yet arrived for making more extended tests on a scale which would give results as conclusive for masonry as the tests made by Professor Lanza, of the Institute of Technolgy, for wooden beams. In considering masonry structures too much allowance has to be made for imperfect workmanship. A one and one-half brick pier is no gauge for a five-foot wall. The book, however, is well worth reading, with caution, but we fancy the results would be misleading to young minds, and would be of not very much value to practical builders.

COMMUNICATIONS

BUILDING ON THE PACIFIC COAST.

LOS ANGELOS, CAL., August 14, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Some time ago a correspondent asked you the best city West likely for an architect to locate in. Your reply was San Diego reports said, "a building boom was asserting itself," but your advise was to make further inquiry.

Now I would take the liberty of saying a few words to all connected with the building-trades. I am an architectural draughtsman, and came here eight months ago, I have not been able to obtain more than two months' work since. Architects are going away these past three months for want of work. I personally know carpenters five months idle, and only could get a few days' work during the past seven months. Bricklayers and all others are in a similar way. The newspapers here make a noise about the great amount of work on hand, but they do not have the honesty to tell all, and those who are depending on their labor for their bread ought to stop away as there are far more hands here than enough to do all the work on hand, or likely to be for the ensuing five years. With reference to San Diego, I enclose a letter from parties there which speaks for that section.

In fact I have had letters from the entire coast, and they are all couched in the same language.

My opinion is, this southern part has been overrun by real estate fellows lying in wait to seize their prey. Evidently they have succeeded well in their endeavors.

Many purchasers who bought on the instalment-plan thinking to sell at a profit, are most anxious to sell now at a loss. I have had an offer lately (just to-day) to take up two lots, and the party would sacrifice 135 per cent of the money paid to evade an instalment now due.

I could give many other evidences that this is not the place to locate in just now for any in the building-trade. Your truly,

DISAPPOINTED.

THE "SAFE BUILDING" PAPERS.

LOUISVILLE, KY., August 15, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Be kind enough and inform through your journal or otherwise if Mr. Louis Berg's "Safe Building" is terminated with the July number of the *American Architect?* and oblige,

SUBSCRIBER.

[The *American Architect* for July 7 closed the last chapter of what is to constitute the first volume of Mr. Berg's work on "*Safe Building.*" It has been decided to publish this first volume during the coming autumn, so that the information may be in more accessible shape than it now is, scattered through the issues of this journal for two years passed. — EDS. AMERICAN ARCHITECT.]

THE BROOKLYN SOLDIERS' MONUMENT.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — The competition for the Soldiers' and Sailors' Monument for Brooklyn, N. Y., is to all appearances a very limited one. Although the committee by means of your valuable paper invites architects and others for competition, the particulars for which may be obtained at the Mayor's office, none of my friends who are willing to send in a work received any answer to their application for particulars. Another striking feature in this so-called competition is the time given, not quite four weeks. Either do the gentlemen who form the committee know nothing about art, or they are indifferent as to a work of art. It is to be hoped that ample time be given to any artist who is willing to compete and that then the committee arrange an exhibition of all the drawings and models, in order that the art-loving public be allowed to judge of their merits.

JUSTICE.

[THE date for receiving competitive designs has just been changed to October 10, 1888. — EDS. AMERICAN ARCHITECT.]

A CORRECTION.

MONTREAL, CAN., Aug. 24, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I notice in your issue of the 7th of July, under the heading of "Canadian Pacific Railway Station," that you say the derrick plant was designed by me. I beg to correct that statement and to inform you that this derrick plant was designed by Mr. M. P. Davis, a member of the firm of Messrs. Wm. Davis & Sons, the contractors for the masonry of this station. Yours truly,

P. ALEX. PATERSON, *Engineer.*

V-SHAPED DRAIN-PIPE.

WORCESTER, MASS., Aug. 22, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Can you inform me if the V-shaped drain-pipe, referred to in your issue of the 18th inst., as having been used by Norman Shaw, is to be found in our market? It seems to me it would be a very useful article in a great many instances and a valuable addition to the stock forms in general use.

Very respectfully yours, STEPHEN C. EARLE.

[WE do not think this shape can be found in the market. Mr. Shaw says, that he has had to get them made to order for him, as they could not be had in England, and they would be still less likely to be found here. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS

FORCE OF NATURAL GAS. — Although the wells about Findlay are under control, the tubing is anchored, and the awful force is held under by gates and levers of steel, it is impossible to escape a feeling of awe in this region at the subterranean energies which seem adequate to blow the whole country heavenward. Some of the wells were opened for us. Opening a well is unscrewing the service-pipe and letting the full force of the gas issue from the pipe at the mouth of the well. When one of these wells is thus opened the whole town is aware of it by the roaring and quaking of the air. The first one exhibited was in a field a mile and a half from the city. At the first freedom from the clamps and screws the gas rushed out in such density that it was visible. Although we stood several rods from it, the roar was so great that one could not make himself heard shouting in the ear of his neighbor. The geologist stuffed cotton in his ears and tied a shawl about his head and assisted by the chemist, stood close to the pipe to measure the flow. The chemist, who had not taken the precaution to protect himself, was quite deaf for some time after the experiment. A four-inch pipe, about sixty feet in length, was then screwed on and the gas ignited as it issued from the end on the ground. The roaring was as before. For several feet from the end of the tube there was no flame, but beyond was a sea of fire sweeping the ground and rioting high in the air — billows of red and yellow and blue flame, fierce and hot enough to consume everything within reach. It was an awful display of power. We had a like, though only momentary display at the famous Karg well, an eight-million-feet well. This could only be turned on for a few seconds at a time, for it is in connection with the general system. If the gas is turned off, the fires in houses and factories would go out, and if it were turned on again without notice the rooms would be full of gas, and an explosion follow an attempt to relight it. This danger is now being removed by the invention of an automatic valve in the pipe supplying each fire, which will close and lock when the flow of gas ceases, and admit no more gas until it is opened. The ordinary pressure for house-service is about two pounds to the square inch. The Karg well is on the bank of the creek, and the discharge-pipe through which the gas (though not in its full force) was turned for our astonishment, extends over the water. The roar was like that of Niagara; all the town shakes when the Karg is loose. When lighted, billows of flame rolled over the water, brilliant in color and fantastic in form, with a fury and rage of conflagration enough to strike the spectator with terror. I have never seen any other display of natural force so impressive as this. When this flame issues from an upright pipe, the great mass of fire rises eighty feet into the air, leaping and twisting in fiendish fury. For six weeks after this well was first opened its constant roaring shook the nerves of the town, and by night its flaming torch lit up the heavens and banished darkness. With the aid of this new agent anything seems possible. — *Charles Dudley Warner, in Harper's Magazine for July.*

THE CHEMICAL CLARIFICATION OF SEWAGE. — Dr. Pfeiffer of Wiesbaden (*Vierteljahreschrift für öffentliche Gesundheitspflege,* 1888, p. 50), has this to say on the insufficiency of the purification of sewage by means of chemical process: "For some incomprehensible reason, this entirely impracticable and, as regards its results, most unsatisfactory mode of treatment has during the last few years grown much in favor, and the author is of opinion that the time has arrived when a strenuous

opposition should be offered to these so-called clarification processes, and when, in the interests of municipal authorities, warning should go forth against the excessive cost of the chemical systems of treatment, as compared with the good they can effect." Assuming that the main object to be accomplished is the removal from the sewage of bacteria, he says: "This may be accomplished in two ways, either by utterly destroying all their germs, or by extracting from the sewage the whole of the food substances which serve for their support."

"Before the influence of bacteria was so well-known as it now is, it was thought all-sufficient of the effluent, from the sewage after treatment with lime, magnesia, alumina, or salts of iron, was rendered clear to the eye, whereas it is no longer a matter of doubt that this clarification is only a treacherous mask, and that, as the food-stuffs of the bacteria remain in the water, it will soon again decompose and become filled with these organisms. It must then be evident that, as no chemical treatment can comply with the requirements of modern science, it is useless to compel towns to adopt costly chemical systems of clarification."

The Mexican Court-yard. — When one hears of houses built around a court they involuntarily think of something Oriental and magnificent, with cool arcades, palm trees and plashing fountains. But as a matter of fact these Mexican houses, though frequently picturesque, are anything but pleasant. The arcades are impressive and pretty enough by moonlight, but the fountain, except in rare instances, doesn't plash, it only creaks and groans, because it is not a fountain at all, but a well with black leather buckets and water unpleasantly suggestive of bacteria and consequent fevers. Then no one's romantic fancy has ever compassed the number and variety of evil smells which necessarily accumulate in a place so badly ventilated, and where all the functions of the household are carried on. Now and then a court-yard in the house of some rich person realizes your ideal and is a very charming place, but as a style of building for the poor and unwashed I should vote to abolish it with all speed. — *Ellen M. Slayden, in Boston Advertiser.*

Electric Conveniencies. — A friend of Professor Elisha Gray's says in verse: —

Time was when one must hold his ear
Close to whispering voice to hear —
Like deaf men, nigh and nigher;
But now from town to town he talks,
And puts his nose into a box
And whispers through a wire.

In olden times along the street
A glimmering lantern led our feet
When on a midnight stroll;
But now we snatch, when night comes nigh,
A piece of lightning from the sky
And stick it on a pole.

Artisans' Dwellings in France. — In connection with the strikes in France, and the general movement among the working-classes which they may portend, it is interesting to note some recent efforts to improve workingmen's dwellings. At Rouen a society has been formed with a capital of £20,000, which has erected six blocks in the centre of the town, capable of accommodating ninety-five families. At Lyons a similar society has built five blocks, accommodating sixty families. The rents are fixed at about the average rate of the several districts, but the tenants have complete sanitary arrangements and a good water-supply into the bargain. In each case a Director of the company visits every tenement once a week with a view of receiving complaints and entering into kindly relations with the tenants. The companies have succeeded so far in paying four per cent on the capital invested. A feature of the scheme at Lyons is that a portion of the capital was provided by the local savings bank, and it is hoped to induce similar banks at Marseilles and elsewhere to do likewise. But even so it will be a long time before France can vie with England in provision of sanitary dwellings for the working-classes. — *Journal des Débats.*

Solidified Petroleum Fuel. — According to the *Revue Scientifique*, the problem of reducing petroleum to a solid state, available for practical purposes, has been solved by Dr. Kauffman, who has followed up the experiments made in the United States with the admixing of soap. He heated the liquid, to which from one to three per cent of common soap had been added, half an hour, until the soap was completely dissolved, when the mixture acquired the consistency of tallow. The article thus obtained may be cut into pieces of suitable size for feeding to furnaces. Solidified petroleum, although it does not kindle readily, burns slowly and steadily and without smoke. The residual ash amounts to only two per cent. The combustion is only one-third as rapid as that of an equivalent weight of anthracite coal, while the amount of heat evolved is more intense.

TRADE SURVEYS

It is natural to look for an improving demand in trade and manufacturing at the opening of September. This anticipation is strengthened at present by several facts, chief of which is, that buyers generally have very little to go and come on. Should there be a sudden rush of orders an enhancement of values would be the natural result. As it is the productive capacity of the country will probably save us from any such apprehension. The best informed authorities in the trade West and East are expressing the opinion at this time that there will be but little modification in values, but little increase in business, and but little expansion of producing capacity for some time to come. This opinion is a safe one to entertain in a general way. Two or three points must be kept in mind to enable us to form any sensible opinion of the probabilities for this winter or next spring. One is that if the law-making branch of the Government is placed in perfect harmony with the common-sense of the people, a great deal of confidence will be gained. Another is, that if the outflow of capital from abroad continues, as it has for years past, that an additional stimulus will be given to the multitude of new enterprises which have been waiting for a clearing up of questions and policies affecting ourselves as a nation. The trade reports of all kinds in newspapers speak of a steadying demand and of low prices, as well as of unsatisfactory railroad earnings, and of decreased bank clearings they unite in saying that the crop prospects are in the main favorable. They incline to the opinion that the manufacturing demand all over the country will increase from week to week. They said that there is a better condition in the petroleum market, an improving condition in the iron trade and good prospects for wheat exports and a quiet condition among the workmen of the country, and a prospect of harmonizing of the interests of the warring railway systems and an upward tendency in certain lines of manufactured products. These reviews are mainly correct so far as they cover surface facts. In so far as they attempt to predict what may be the condition six months hence they are not safe guides. The most patent fact in the situation to-day is that there is more capacity than there is employment, more money than can be safely used, more labor in the market than is wanted, and increasing weakness among the smaller tradesmen and manufacturers who entered into business during the past two or three years. The commercial authorities are quietly predicting a general weeding-out within the next year of these weaker traders. Jobbers and manufacturers who watch the course of trade closely think that there will be a sweeping up or out of trade channels of a great many houses and firms that have crowded into already very crowded channels. These dangers can be obviated only by a greater increase in commercial and manufacturing activity, in other words unless we are visited within the next six months with an unusual activity there will not be remunerative employment for all the capital, labor enterprise or of looms, wheels and forges. For the first time in three years the country is coming in sight of a possible over-production or of an over-producing era. The danger is as yet remote. A number of influences may likely arise to hasten its coming. The leaders in commerce and transportation are recognizing the danger, and, in a way, are endeavoring to avoid it. The bulk of attention, however, is given to mere political trifles which effect the success of one side or another of the political parties. The bulk of the speculative element of the country are looking for immense crops. The average manufacturer of the country is looking simply for big fall orders, the average farmer is looking for a heavy demand for his products. The cotton-growers are agitating themselves to see how they can avoid being fleeced by the Bagging Trust. The mining interests are looking forward with more confidence than they have for months to a heavy and more remunerative demand. There are behind all these great interests two or three causes quietly at work which may strengthen the situation and improve their chances, or which may destroy the anticipation of the controllers of these great interests. The comparative steadiness of values during the past year or two has been a source of considerable confidence. Some influences are now at work that may overturn this confidence. The trade organizations that exist to restrict production and fix prices have done much, but they are reaching a point where their control is in jeopardy, hence the organization of trusts. The supply of foreign capital is relied upon by American managers to enable them to pull through safely another year to steady values and create commercial activity. The banking interests predict that there will be no scarcity of money, and that there will be no serious decrease in the ability of borrowers to pay their loans. The exporters state that there will be fully as large a demand for our staple products as there has been in any past year. They figure out that cotton, wheat, oil, grain and our other articles of chief export will be in as great demand as heretofore, and sell at as high prices.

The promoters of new enterprises throughout our own country estimate that the demand next year for all kinds of products will be ten per cent greater than this year. The rank and file of the manufacturers of the country entertain the same opinion. It is shown in their quiet increase of capacity and in their substitution of new machinery for old, and larger and better engines for older and smaller ones. The manufacturers of textile goods have steadily improved their capacity. Not in every town and city but in the aggregate there has been almost as much increase in capacity as last year. The boot and shoe manufacturers have more idle capacity this year than last because they have put in more machinery and have increased their producing power. The paper makers and hardware manufacturers, electrical machinery manufacturers, boiler and engine makers have all increased their capacity and at the present time, according to the statements of some of the leading authorities in these industries, there is a stronger inquiry for future supplies and stocks than there has been since the opening of the season. While there is dulness in the iron trade there is activity in the shops where iron and steel are worked up into practical shape. In the West the agricultural implement makers have been liberal buyers of steel. The manufacturers of pipes and tubes have been during the past two or three weeks the buyers of a great deal of material. The manufacturers of woodworking machinery have been rather slack for some months but orders for the past two or three weeks have encouraged them to increased efforts. The building of elevators in the Northwest it is said will receive a sharp stimulus this fall through the heavy demand for cereal products. Western architects and builders give their favorable opinion to this prophecy. The manufacturers of lake craft between Buffalo and Duluth are making contracts which will keep the boat and ship building capacity of the lakes remarkable busy in the next few months. New pipe lines are to be built and this will help the iron trade. Quite a number of railroads in the far West will place orders for cars to a large amount just as soon as their managers see prospects of a termination of the present conflict of interests. The smaller industries thoughout the West have during the past two weeks felt a little improvement in the way of urgent orders for work for early delivery. Jobbers in Boston, New York and Philadelphia have recently had some encouragement in the way of duplicate orders for the early delivery of staple goods, whether it to be for locomotives or for cotton goods there is a stronger inquiry and demand at the opening of September than there has been at any time since April last. Business men find themselves, relatively speaking, better off than they were inclined to anticipate when they took into account last spring the vague dangers of the campaign. The country has been a good buyer in all branches. The managers of our industries have done exceeding well. The workman have acted wisely. Trade has been seeking new fields and our general market has been quietly enlarging itself. West of the Mississippi trade has doubled itself since 1885. Southern trade has been quadrupled in four years, so say some of our enthusiastic staticians.

S. J. Parkhill & Co., Printers, Boston.

The American Architect and Building News

ADVERTISERS' TRADE SUPPLEMENT.

No. 75. SATURDAY, SEPTEMBER 1, 1888. VOLUME XXIV. No. 662.

IMPROVED EAVES TROUGH, GUTTER AND ANGLES.

We introduce here cuts of what have proved to be great labor-saving devices for the tinner, and which are rapidly growing in popularity. The merit of these articles lies not alone in the fact of their being time and labor saving, but is in a large measure due to the excellent quality of materials used, the superior workmanship bestowed upon them, and the facts of their being nicer in appearance, more durable and far less likely to become leaky than troughs and gutters made in the old way.

The manufacturers, Hatten, Galpin & Co., Binghamton, N. Y., are greatly encouraged by the favor which these goods are meeting, particularly in the West through Chicago jobbers. They say that if this trade continues to increase, as it has lately been doing, Chicago will "take the belt."

The question is often asked, which is best for eaves trough and gutter, terne or tinplate? This firm say on this point: "From experience and numerous tests, we are satisfied that terne is much superior to tin for such cases. While ternes cost less, they are worth at least twenty-five per cent more than tin for troughs and gutters. The tough, heavily leaded IX ternes that we use for our eight-foot seamless

troughs will, with proper care, remain good as long as any other part of the building."

The longest of the cuts shown on this page represents the eight-foot seamless eaves trough made by this house. It is made half round in sizes from four to ten inches, IX and IXX terne, IX bright tin, B.B. galvanized-iron, and sixteen-ounce brazier's copper. The other long cut presents a side view of eight-foot wide gutter. It is made of 14, 17, 20, 24 and 28 inch terne, tin, copper and galvanized iron. Another cut will be recognized as representing end views of wide gutters. Special designs of trough and gutters are made to order. Among the special advantages claimed for these goods by the manufacturers are these: "The metal used in our troughs and gutters is the best grade to be obtained in America and Europe; our IX and IXX terne plates are coated by the old process on 'Martin-Seimens' soft sheets; these troughs will last four times longer than short length IC troughs; they are straighter, stiffer, stronger, and improve the looks of the building; they save the labor and solder of six joints in every sixteen feet; 500 feet can be made and put up quicker than

100 feet of short troughs."

Something new for the benefit of tinners is shown in the cuts of the new patent angles or mitres for eave-trough corners made by machinery. The manufactureres say that since the advent of ready-made stove-pipe elbows there has been nothing produced in the tinners'-supply line that will be more welcome than these ready-made angles. A special feature is the patent rib pressed in one piece at the mitre joint, to stiffen and strengthen them. They are cut and formed by machinery, and are put upon perfect forms when soldered, so they are correct angles. They are made with either inside or outside bead in all ordinary sizes, and of all grades of IC and IX tin and terne, galvanized-iron and copper. We have seen samples of these mitres in terne plates and in galvanized-iron, and they are certainly admirable in every respect. They are perfect in form, accurate, very strong, and pleasing to the eye. Hatten, Galpin & Co., make them in all sizes and all kinds of metals. They will be supplied direct or through jobbers.

HATTEN, GALPIN & CO.,
BINGHAMTON, N. Y.

NOTES.

The Whittier Machine Company are putting in one of their double-screw freight elevators for Messrs Abram French & Co., of Boston. Also, they are constructing for the Piedmont Manufacturing Company of Piedmont, S. C., six steel boilers, each 5½ feet in diameter, and one two ton freight elevator; and for the Victor Cotton Mills, Charlotte, N. C., three steel boilers and one freight elevator.

"Gilbertson's Old Method" Roofing Tin has been specified by the Architect of the new B. & O. Depot, at the foot of Smithfield Street. One thing certain, the coming generation are sure of a good roof from rain and storm while waiting for trains at the B. & O. — *The Builders' Gazette, Pittsburgh, Pa.*, Aug. 15, 1888.

BUILDING INTELLIGENCE.

Reported for the American Architect and Building News.

ALTERATIONS.

Chicago, Ill.—J. M. Gambell, alterations, Halsted St.; cost, $5,000; architect, C. P. Thomas.

L. Silverman, three-st'y front addition, Dearborn Ave.; cost, $5,000; architects, Adler & Sullivan.

APARTMENT-HOUSES.

Chicago, Ill.—H. Brown, 2 three-st'y flats, Monroe St.; cost, $8,500; architect, C. H. McAfee.

C. Gaengle, 2 two-st'y flats, West Polk St.; cost, $5,000; architect, L. Wichman.

J. Shepard, two-st'y flats, West Fourteenth St.; cost, $3,000; architect, F. La Point.

W. W. Henderson, 2 three-st'y flats, West Lake St.; cost, $14,000; architect, J. J. Kohn.

F. Karasek, two-st'y flats, West Twelfth St.; cost, $3,000; architect, J. Chavenik.

M. Kosak, two-st'y flats, Wall St.; cost, $3,000; architect, J. Krevanik.

G. Bischoff, two-st'y flats, Cleaver St.; cost, $3,500; architect, F. Miller.

M. H. Carstens, two-st'y flats, West Fourteenth St.; cost, $3,000; architect, P. T. Werges.

E. S. Wendel, four-st'y flats, Blue Island Ave.; cost, $9,500; architects, Schaub & Berlin.

J. M. Gamble, 2 three-st'y flats, West Lake St.; cost, $40,000; architect, C. R. Thomas.

M. Lanfeaski, three-st'y flats, West Fourteenth St.; cost, $3,800; architect, J. F. Deptulski.

A. Amandson, three-st'y store and flats, West Erie St.; cost, $7,000; architects, Lutken & Thiasien.

J. Gotuliewski, two-st'y flats, Crittenden St.; cost, $3,500; architect, M. Tukowski.

N. Koch, three-st'y flats, La Salle Ave.; cost, $7,500; architect, J. Zittel.

T. Cmolik, three-st'y flats, West Seventeenth St.; cost, $4,000; architect, F. Sager.

S. Hanson, two-st'y flats, West Ohio St.; cost, $3,000; architect, C. R. Rosmusson.

FACTORIES.

Boston, Mass.—*Kemble St.*, near Gerard St., Ward 20, two-st'y brick factory, flat roof, 124′ x 189′; owners, Pearson Cordage Co.; builders, Webster, Dixon & Co.

Chicago, Ill.—A. Harris, four-st'y factory, Jefferson St.; cost, $10,000; architect, J. Frank.

P. J. Hurther, two-st'y factory, Weld St.; cost, $15,000; architect, J. Zittle.

RAILROAD BUILDINGS.

Boothroyn, Pa.—Frame station; cost, $2,500; owners, B. & O. R R.; also several other small stations and large shops for the same Co. which will be built as soon as possible; architect, A. H. Bieler, Baltimore, Md.

Woodstock, Va.—Stone station, slate roof; cost, $4,000; owners, B. & O. R. R.; architect, A. H. Bieler, Baltimore, Md.

WAREHOUSES.

St. Louis, Mo.—Three-st'y brick warehouse; cost, $7,000; owner, Dr. J. H. McLean; architects, Kirchner & Kirchner; sub-let.

MISCELLANEOUS.

Baltimore, Md.—G. W. Gail & Ax are to have built a three-st'y brick warehouse, n s Lee St., bet. Charles and Light Sts.

Two and-one-half-st'y frame infirmary building for McDonogh Institute, Bath Co.; cost, $5,000; architect, A. H. Bieler.

Boston, Mass.—*Spring St.*, Ward 23, one-st'y frame waiting-shed, 6′ x 64′; owners and builders, Old Colony Rd.

Park St., Ward 23, frame waiting-shed, 6′ x 64′.

La Grange St., Ward 23, frame waiting-shed, 6′ x 64′.

South St., Ward 23, frame waiting-shed, 6′ x 64′.

Annawan St., Ward 23, frame waiting-shed, 6′ x 64′—all for Old Colony Rd.

Medford St., No. 425, rear, Ward 4, one-st'y brick kiln, 38′ x 7-′; owners, Philadelphia & Boston Fire Brick Co.; builders, Gooch & Pray.

Braintree St., Ward 25, one-st'y brick power station, flat roof, 36′ x 20′ 6″; owners, West End R. R. Corporation; builders, H. M. Leach & Co.

Brooklyn, N. Y.—*Bedford Ave.*, e s, 50′ South Eighth St., four-st'y brick store-building, tin roof; cost, $8,000; owner, Wm. S. Liptrott, on premises; architect, E. F. Gaylor; masons, W. & T. Lamb, Jr.; contractors, Jno. Rueger.

Twenty-third St., pier foot of, two-st'y frame storage, board roof; cost, $3,000; owner, Wm. M. Tebo, on premises; architect and builder, D. E. Harris.

Philadelphia, Pa.—*Paul St.*, n Meadow St., two-st'y foundry; builders, R. C. Winnals & Bro., 4633 Worth St.

Thirtieth St., bet. Thomas and Master Sts., three-st'y mill; builders, R. C. Winnals & Bro., 4633 Worth St.

Darby Rd. and Fifty-ninth St., three-st'y brick and stone infirmary; contractors, Foot & McLaughlin, 317 Cook St.

Wharton St., bet. Eleventh and Twelfth Sts., two-st'y hall; contractor, Matthew Schmidt, 217 Walnut St.

Columbia Ave., cor. Broad St., Columbia Ave. saving fund; contractor, P. H. Somerset, 1513 North Twelfth St.

Reed St., s s, bet. Meadow St. and Delaware Ave., eight-st'y filter-house; contractor, Allen B. Rorke, 423 Walnut St.

St. Louis, Mo.—Two-st'y brick club-house; cost, $7,000; owner, R. Norris; builder, H. E. Roach.

PROPOSALS.

Proposals for dredging. United States Engineer Office, Mobile, Ala., August 27, 1888. Sealed proposals for dredging in Mobile Harbor, Ala., will be received at this office until 12 M., on Saturday, the 15th day of September, 1888, and opened immediately thereafter in presence of bidders. Specifications, general instructions to bidders and blank forms of proposal will be furnished on application to this office. A. N. DAMRELL, Major of Engineers, U. S. A. 663

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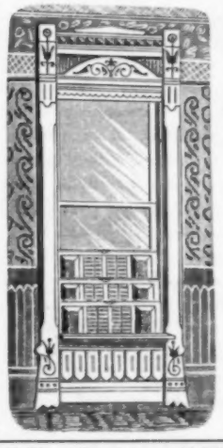

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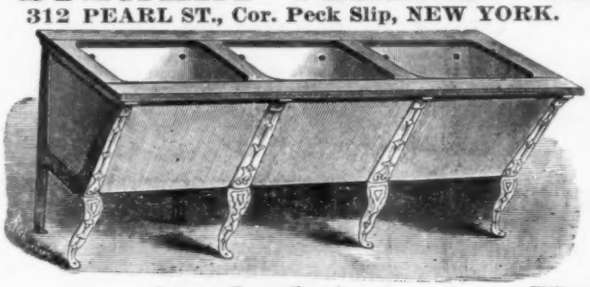

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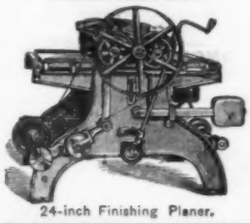

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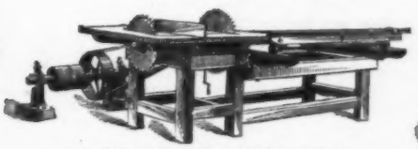

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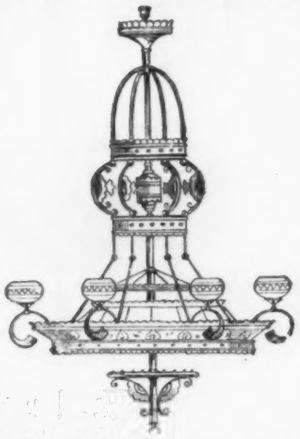

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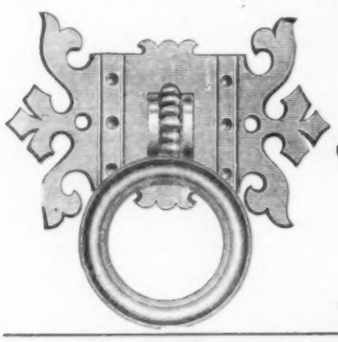

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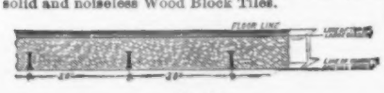

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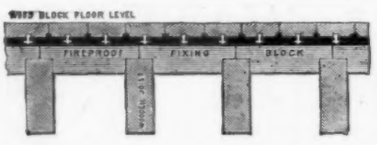

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